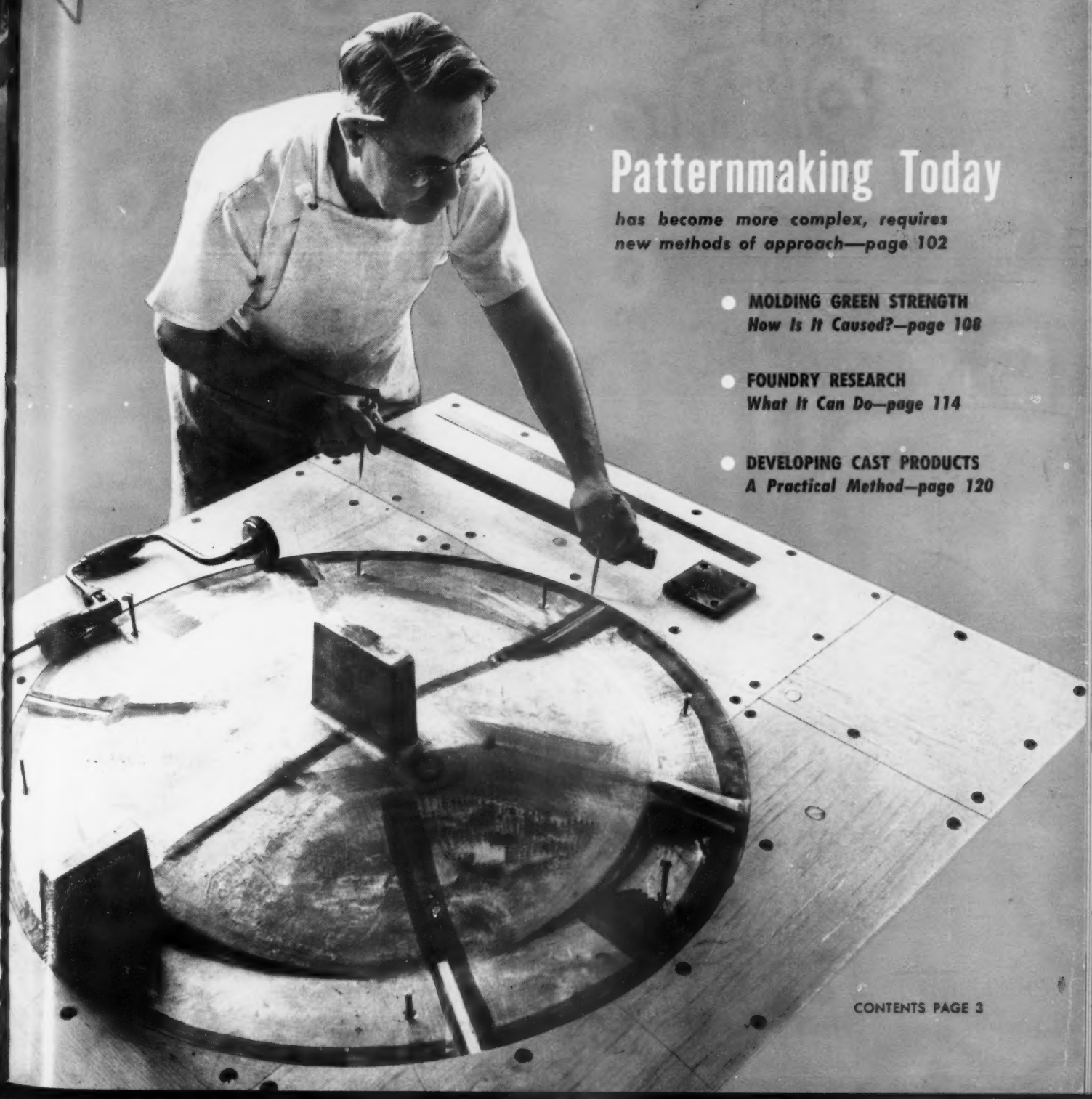
OCTOBER 1952

FOUNDRY

...WHEREVER METALS ARE CAST



Patternmaking Today

has become more complex, requires new methods of approach—page 102

- **MOLDING GREEN STRENGTH**
  How Is It Caused?—page 108
- **FOUNDRY RESEARCH**
  What It Can Do—page 114
- **DEVELOPING CAST PRODUCTS**
  A Practical Method—page 120

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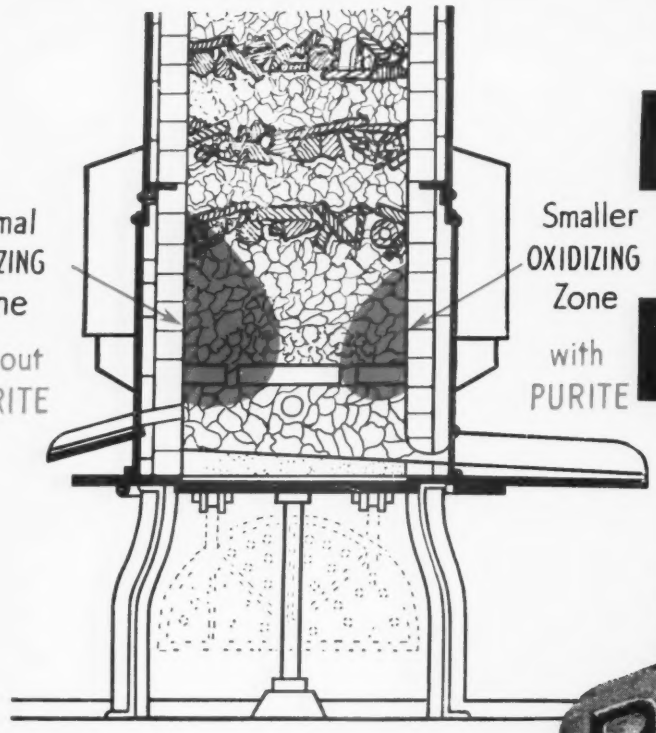
Keep Production Unifor

with PURITE in Every Me



Purite produces a sodium (yellow) flame in the melting zone of the cupola and accelerates the combustion reactions $C \rightarrow CO_2 \rightarrow 2CO \rightarrow 2CO_2$, thus speeding up the combination of oxygen in the blast and carbon in the coke. In this way, Purite limits the zone of free oxygen in the cupola to a smaller hotter area, reduces oxidation of the metal and increases melting temperatures.

To get top production of finished castings from every melt, be sure you flux and desulphurize with Purite. It forms a highly active refining slag in the hearth of the cupola which expels entrapped gases and reacts with the impurities picked up by the iron in trickling down over the coke. Non-metallic inclusions are converted into liquid sodium-silicates that rise out of the metal and are carried off in the slag. Thus Purite, by expelling the impurities, which cause pinholes and segregated defects, improves the soundness and machinability of iron castings and reduces foundry losses.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. Purite produces a higher percentage of finished castings per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.
3. Purite gets to all the iron quicker.
4. Purite is time-tested and proven for unsurpassed desulphurizing uniformity.
5. Purite comes in 2-lb. pigs and 2 oz. tablets—no weighing or measuring required.
6. Purite is 100% pure fused soda ash—you do not pay for inert materials.
7. Purite does not crumble—no waste—no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada. Mathieson Chemical Corporation, Baltimore 3, Maryland.

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CHEMICALS

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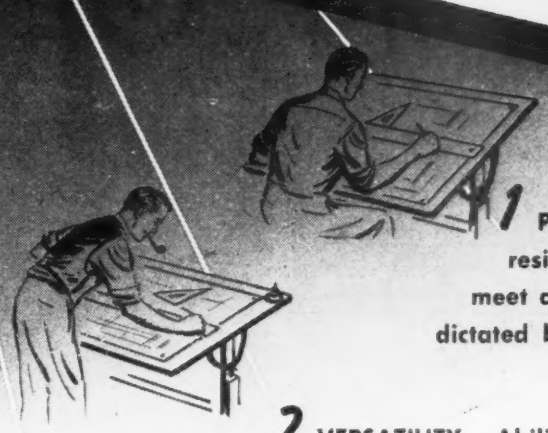
TRIPLE ALLOY STEEL CASTINGS *containing* NICKEL



1 PERFORMANCE—Strength and toughness, resistance to wear, fatigue or shock to meet a wide range of requirements, as dictated by design.

2 VERSATILITY — Ability to meet varied specification demands after suitable heat treatment.

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Triple-alloy steel castings have established outstanding service records in some of the most exacting industrial applications. Many of the lower alloy types can be handled in the shop with techniques not differing greatly from those employed with carbon steels.

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Research into the problems of seacoal performance has proved that, to make good seacoal, the base coal must be high in volatile combustible matter (V.C.M.). Low sulphur and ash content, also, are desirable. The coal mined by FEDERAL at Crown Hill more than meets such requirements. Note the V.C.M., sulphur and ash content in the analysis of Crown Hill coal made by the Bureau of Mines, U. S. Department of the Interior.

For comparison, check the analysis of the seacoal you're now using. Perhaps you'll find you're not getting the quality you'd get in Crown Hill.

PROXIMATE ANALYSIS
(Moisture Free)

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Ash	3.7%

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Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
Fusion Point of Ash	2780° F

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OCTOBER 1952

FOUNDRY

Volume 80—Number 10

NBP CCA

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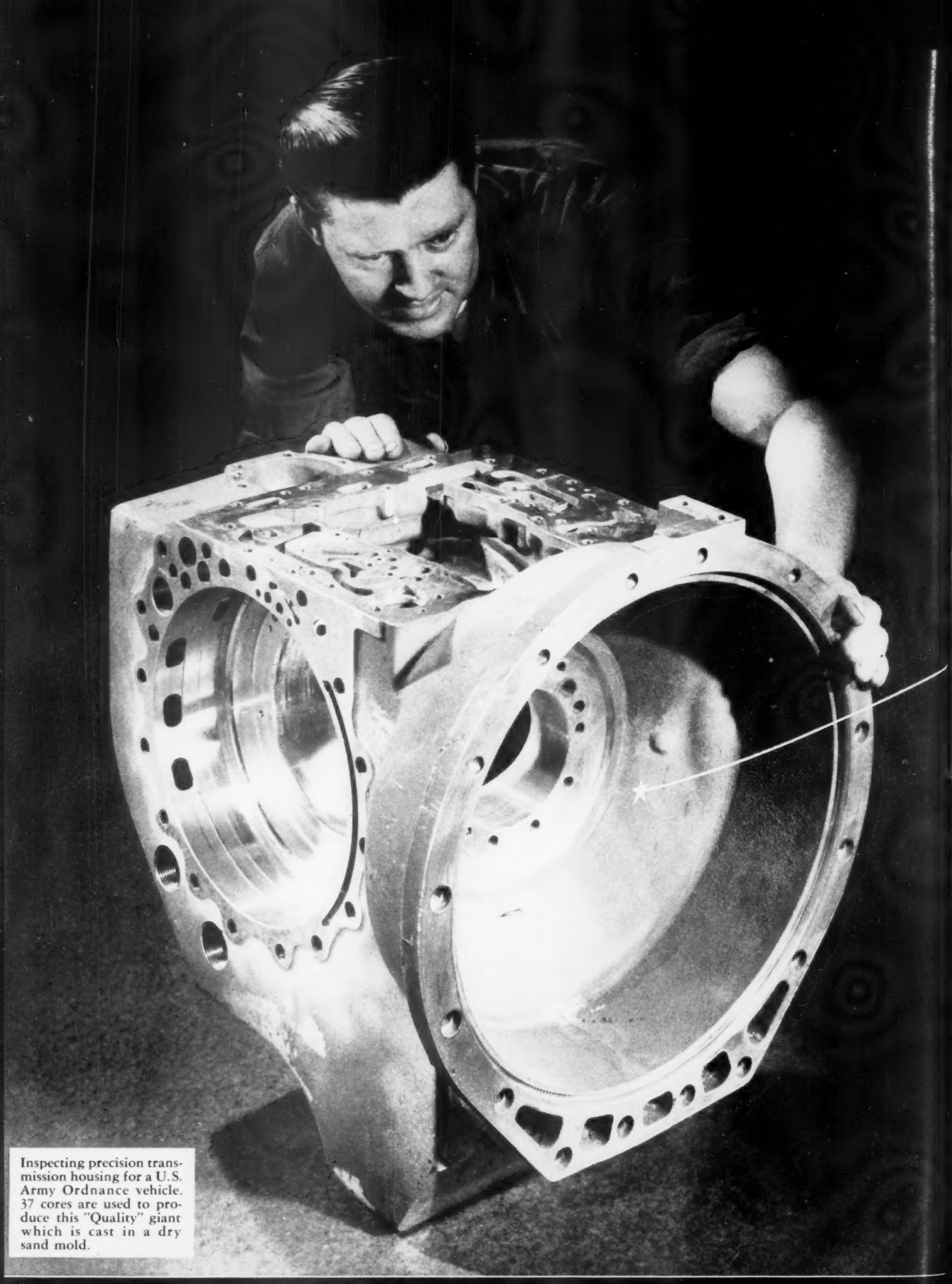

Inspecting precision transmission housing for a U.S. Army Ordnance vehicle. 37 cores are used to produce this "Quality" giant which is cast in a dry sand mold.

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LINOIL...

★ ONE GOOD REASON WHY *Quality* ALUMINUM CASTING CO. LIVES UP TO ITS NAME

Setting cores in the mold for the casting of a large impeller. Because fins in the casting are extremely thin, the utmost care must be exercised in the core room.

Hard-to-make castings held to close tolerances are a specialty of Quality Aluminum Casting Co., Waukesha, Wisconsin.

Core work in many of the castings is highly intricate. This transmission housing, for example, takes 37 different cores; some large, some tiny, all important. A few cores are so located that adequate venting is a problem.

Quality Aluminum expects each casting to be sound and accurate, leaves nothing to chance to insure this. One step is to make up a set of plaster cores for checking the fit of individual pieces. Another is to specify LINOIL for the entire job . . . and every other job as well.

LINOIL is used at Quality for two reasons: first, they find it flexible enough to fit into any core job, from large mold sections to delicate interior cores. And second, they've used LINOIL for over thirty years—know from experience that it is a constant factor in their production.

Your LINOIL representative will be happy to demonstrate LINOIL in your foundry. Ask him the next time he calls.

★ When there's a *Question of Quality*, switch to **LINOIL!**

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Pangborn's BLASTMASTER Rotoblast® Barrel must be good!

Pangborn's BLASTMASTER ROTOBLAST Barrels on the production line. A total of 42 orders in 86 days makes it imperative to place *your* order now for delivery as soon as possible!

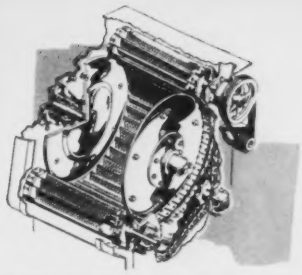
Within just 86 days of the introduction of Pangborn's BLASTMASTER ROTOBLAST Barrel, a total of 42 were sold! And experienced foundrymen don't plunk down hard cash unless they *know* what they're getting!

Check the features of this Barrel that add to the performance of ROTOBLAST: Non-clogging work conveyor! Automatic throw-out torque arm! Absolute abrasive-tight door and housing! Efficient cleaning and reclaiming system! Quick-acting work loader! Centrally-located push-button control panel! And all this in a Barrel occupying a minimum of floor space and head room!

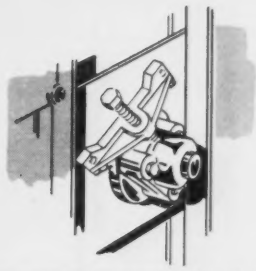
See now why the 42 sales? And that's just the beginning! If *you're* interested in more efficient, more rapid, more economical batch cleaning, better get your order in! For more information, write for Bulletin 223 to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.*

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

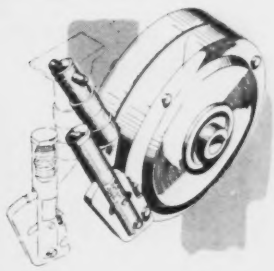
86 DAYS-



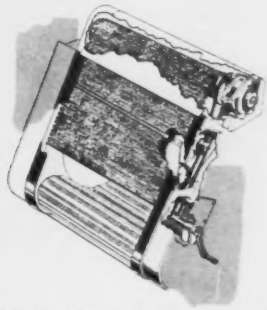
WORK CONVEYOR will not clog. Hardened steel chain with special metal slats designed so no aperture will pinch work. Drives through V-Belt to Spur Gear-Reducer mounted directly on work conveyor shaft—simple—effective—safe.



WORK CONVEYOR TAKE-UP is on bottom shaft where weight of conveyor makes it easier to adjust.



AUTOMATIC THROW-OUT TORQUE ARM protection disengages the barrel drive in case of jams. Works in both loading and unloading directions.



ABRASIVE-TIGHT DOOR. Woven wire mesh construction backed with vulcanized rubber. Rolls up compactly when door is opened. Slides on rollers in mechanized labyrinth. Always protected against abrasive action and tumbling castings by heavy rubber curtain.

ROTOBLAST saves you money five ways:

- *SAVES LABOR* with push-button operation
- *SAVES SPACE* because machines are compact
- *SAVES TIME* by cleaning more loads per day
- *SAVES POWER* since no compressor is needed
- *SAVES TOOLS* because all scale is removed

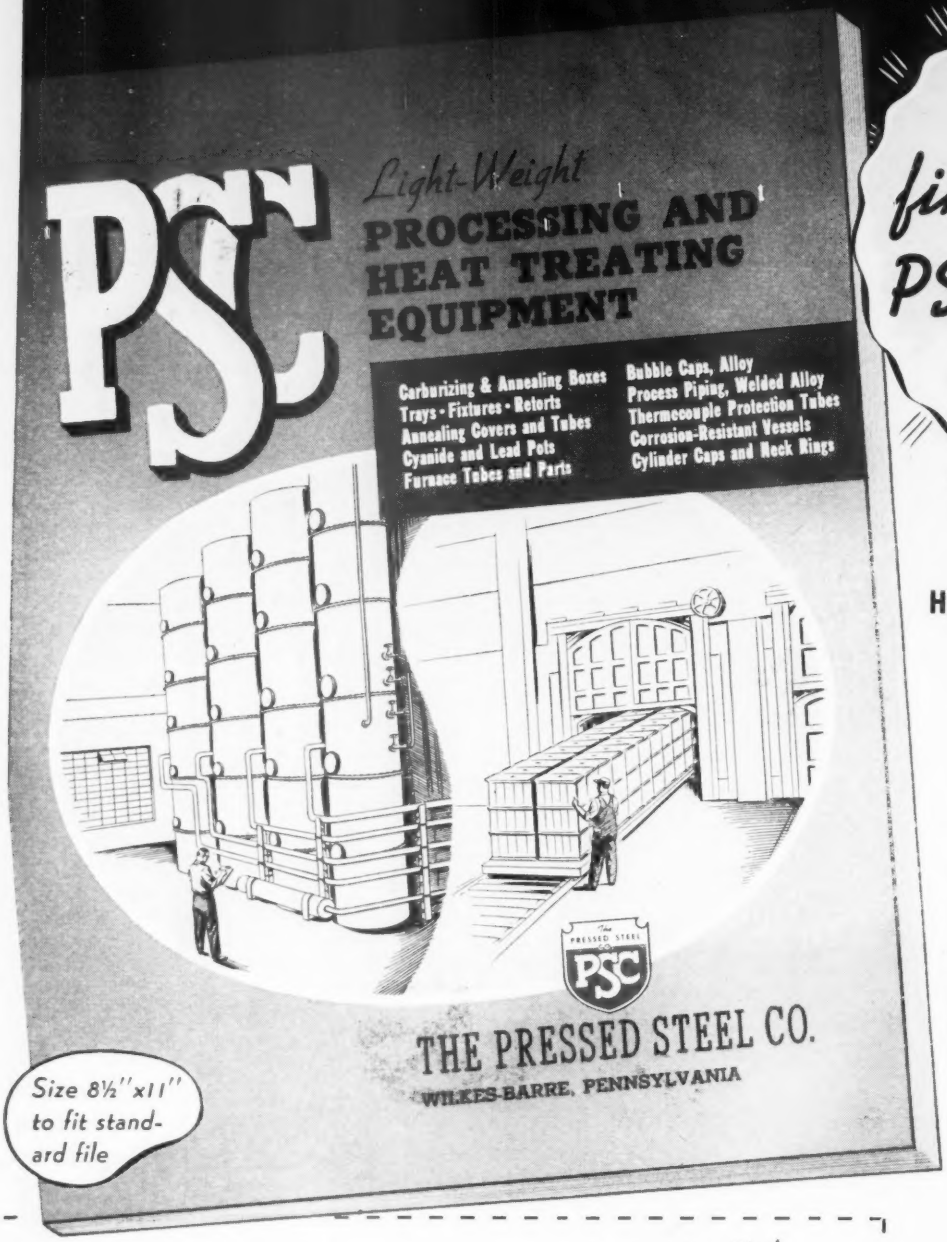
Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

MEMBER FEMA

IF YOU USE SHEET ALLOY EQUIPMENT IN ANY OF THESE 30 CLASSIFICATIONS



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You will find the new PSC CATALOG helpful

CLASSIFICATIONS OF PSC HEAT AND CORROSION-RESISTANT INDUSTRIAL EQUIPMENT

Baskets, annealing & carburizing
Baskets, cyanide dipping
Baskets, pickling
Bends, alloy pipe & tubing (welding)
Boxes, annealing & carburizing
Caps, bubble (fractionating tower & still)
Caps, cylinder (compressed gas)
Covers, annealing (Bell furnace)
Covers, annealing (elevator furnace)
Fixtures, carburizing
Flights, conveyor (syn. rubber plant)
Headers, air pre-heating
Manifolds, gas exhaust
Muffles, carburizing
Piping, process (alloy only)
Pots, carburizing & annealing
Pots: lead, cyanide & salt
Racks, annealing & carburizing
Racks, sheet pickling
Retorts, carburizing
Rings, neck (compressed gas cylinder)
Tanks, copper annealing
Tanks, pickling
Trays, annealing & brazing
Tubes, annealing
Tubes, furnace vent
Tubes, radiant furnace
Tubes, thermocouple protection
Tubing, corrosion & heat resistant
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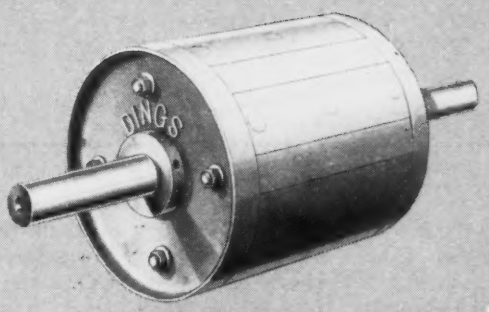
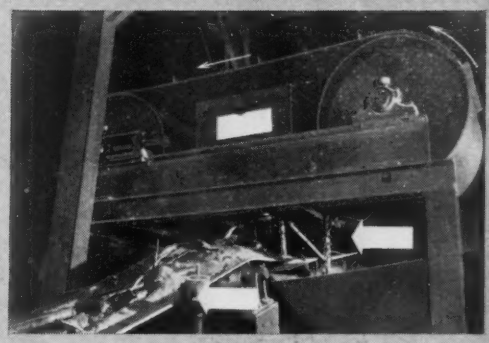


Dings Non-electric, Permanent Perma-Pulley.



Dings Extra Powerful Self Cleaning Rectangular.

1. 2. 3. 4.

Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks".* Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

Dings

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4708 W. Electric Ave., Milwaukee 46, Wisconsin

SEND THIS COUPON
OR DROP A POSTCARD

Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
☐ RECTANGULAR ☐ "HOLD-TITE" plus

Article on "Lowering cleaning room costs through the use of magnetic chucks"

NAME.....

COMPANY.....

ADDRESS.....

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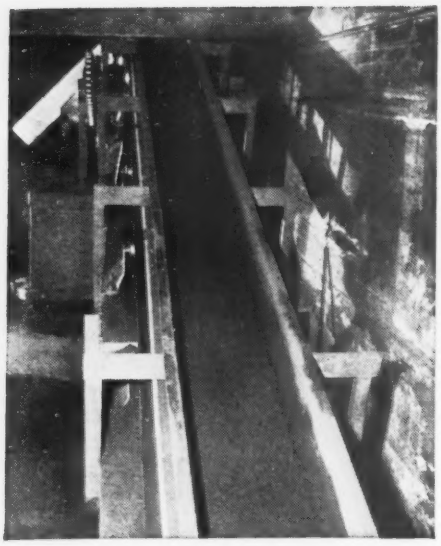

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FOR ALL HOT APPLICATIONS

1. Job-designed to meet specific operating conditions.
2. Made of finest heavy-duty hard silver duck.
3. Tensile strength of duck well over 750 lb. per inch of width.
4. Inner-locked double stitching permanently prevents ply separation.
5. Special impregnation plus asbestos and an insulating member give high heat resistance.
6. Densely woven to resist "come-and-go."

Studebaker has standarized on Imperial Belting. In the installation pictured above, Imperial Insulated Sahara moves very hot sand up an 18° incline conveyor. Two years in operation, the belt is just a youngster with a long, useful service life ahead.

Write for Data Sheet 47-8 and prices. (No salesman calls unless requested)

IMPERIAL BELTING COMPANY
1755 South Kilbourn Ave., Chicago 23, Ill.

Imperial
INNER-LOCKED
BELTING
Engineered Belting—
The Right Belt for Each Job

With the EDITORS

DEADLINES: When Benjamin Franklin wrote "but in this world nothing is certain but death and taxes," he should have included copy deadlines. Since Franklin was a prolific writer, as well as a printer, he must have realized that the publication does not go to press on schedule unless the copy for the printed material is ready for the printer on time. Because the deadline for the copy to appear in this department in the October issue is due, these lines are being written on the last day of the vacation.

—o—

Repeat Performance: The vacation was spent among the very pleasant Indiana surroundings which were described in this column just a year ago. We have had a wonderful rest and some good fishing. But I think there is a certain anticipation in getting back on the job to see what has happened in the industry during these few weeks away. Right now we are wondering if there has been an upturn in foundry business, if foundrymen have been granted price relief to compensate for added costs, and if some of the other problems facing the industry are any nearer solution?

—o—

Free Enterprise: For several weeks before the vacation, I had been trying to find time to read Clarence B. Randall's recent book, "A Creed for Free Enterprise" (Little, Brown & Co.) and this became the first order of business after arriving at the lake. If you have not taken time out to read this "ringing statement of faith in the American system of free enterprise by the most trenchant spokesman for our heavy industry" you have missed a most stimulating discussion of management thinking. One of our most progressive foundrymen tells me that he is providing copies for every man on his management team.

—o—

Busman's Holiday: Just as a change of pace, I spent one afternoon at the Midwest Foundry Co., Coldwater, Mich., visiting with R. T. Archbold, John E. Wolf and Roland S. Bannister, and inspecting progressive operations in the production of gray iron and investment castings. Very complicated alloy steel castings are being produced by the process which uses a pattern assembly made of plaster rather than wax. Advantages claimed include a lower price, greater ease and accuracy in assembling, and smoother and stronger joints, which eliminate hand work and minimize the number of patterns lost during the dip coat and investing operations. Midwest continues to expand both its gray iron and investment casting operations.

—o—

Anniversary: After reading my September comment on the impressive record of Frederic B. Stevens Inc. for continuous advertising in FOUNDRY, W. J. Cluff, president of Stevens has written, "I am personally very proud of the fact that our company has been represented in your pages for so many years, and that we are thus identified with the foundry industry in a very positive way."

Ralph J. Zemanek, general sales manager, United States Graphite Co., Saginaw, Mich., also writes: "We wish to congratulate you on your 60th anniversary for the magazine and as an interesting note, we happen to have a January, 1907 issue of FOUNDRY and find our advertising in it. You must have a very good policy in order to hold customer good will for that long and make your magazine valuable to suppliers and foundrymen alike. We wish to extend our best wishes for success in the future years."

—o—

Retirement: The controversy over compulsory retirement of older workers continues, and it is good to see that many are not so sure that such retirement may be beneficial to industry, the worker or to our general economy. Many men continue to do excellent work in their particular fields long after the arbitrary age of 65, which seemed to be the proper point for retirement when the Congress set up social security some years back. When thinking of men who have found joy in work long after retirement age, I always think of my Dad, who became probation officer of the Marshall Circuit Court

(*Concluded on page* 12)

INTERESTED IN *Reducing* SCRAP LOSS?

try Harbison-Walker's

Refractory Strainer Cores

Many foundries have reduced scrap loss and improved their castings by adopting Harbison-Walker Refractory Strainer Cores. Made of a hard, strong ceramic material, moulded under pressure and kiln-fired at a high temperature, they are uniformly accurate in shape and size, cleanly formed, non-spalling, erosion-resistant and economical.

With equivalent gate diameters ranging from ⅜-inch to 1½-inch, Harbison-Walker Refractory Strainer Cores in seven sizes provide for all normal requirements.

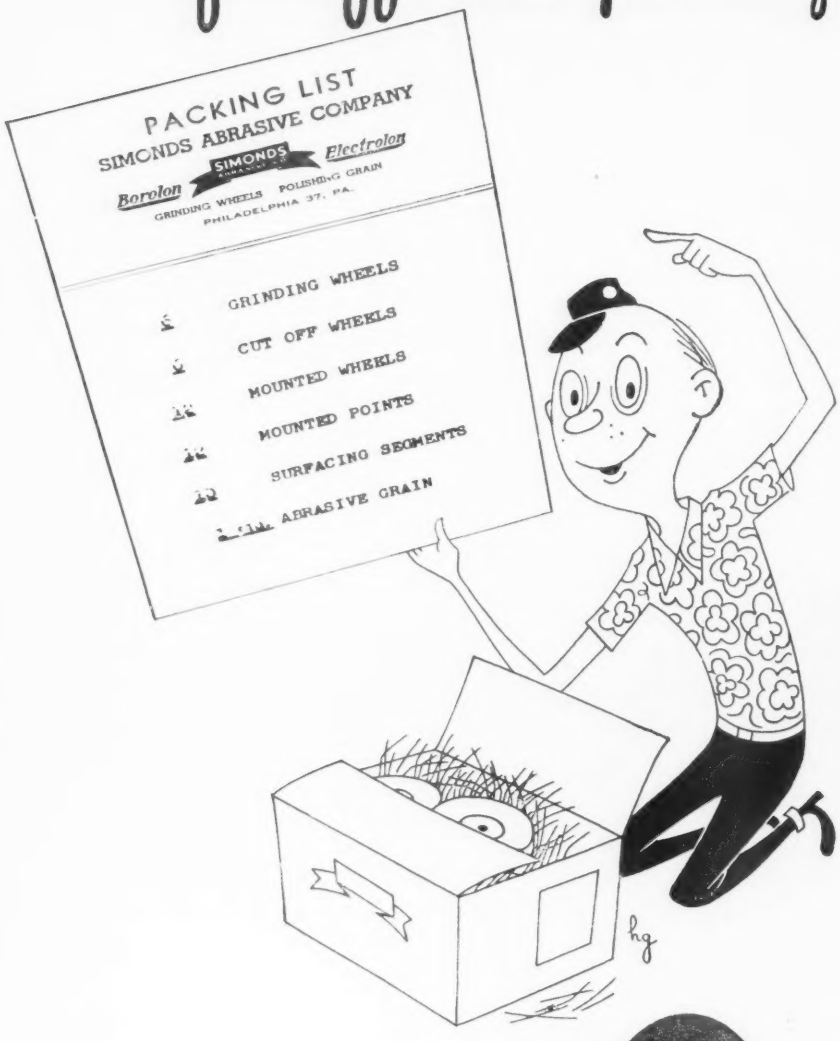
Cleaner castings are made when Harbison-Walker Refractory Strainer Cores are used; chipping, welding and grinding are substantially reduced; scrap losses are decreased; production is increased and labor costs are reduced.

Now available for prompt shipment, Harbison-Walker Refractory Strainer Cores are packed in sturdy cartons of a size and shape most convenient for the moulder. Write for bulletin describing this modern aid to economical foundry operation.

HARBISON-WALKER REFRACTORIES COMPANY AND SUBSIDIARIES

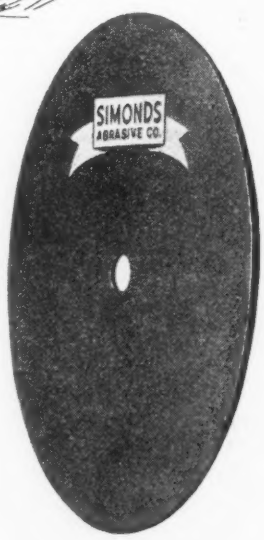
World's Largest Producer of Refractories
General Offices: Pittsburgh 22, Pa.

Winning Ticket for efficient grinding



Top grinding results per grinding wheel dollar! That's the essential economy "plank" in any "platform" for productive grinding. And that's where your Simonds Abrasive Co. distributor can be of real help to you.

He carries Simonds Abrasive Company grinding wheels for all your jobs. They're quality-controlled for lasting performance . . . and accurately specified to enable you to order the ones that conform exactly to your needs.



Send for free data book and name of your distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

at Plymouth, Ind., some years ago after nearly a half century in the school business. Now, at nearly 83, Dad continues to work every day, drive around the county on official business and to enjoy the service he is performing.

—o—

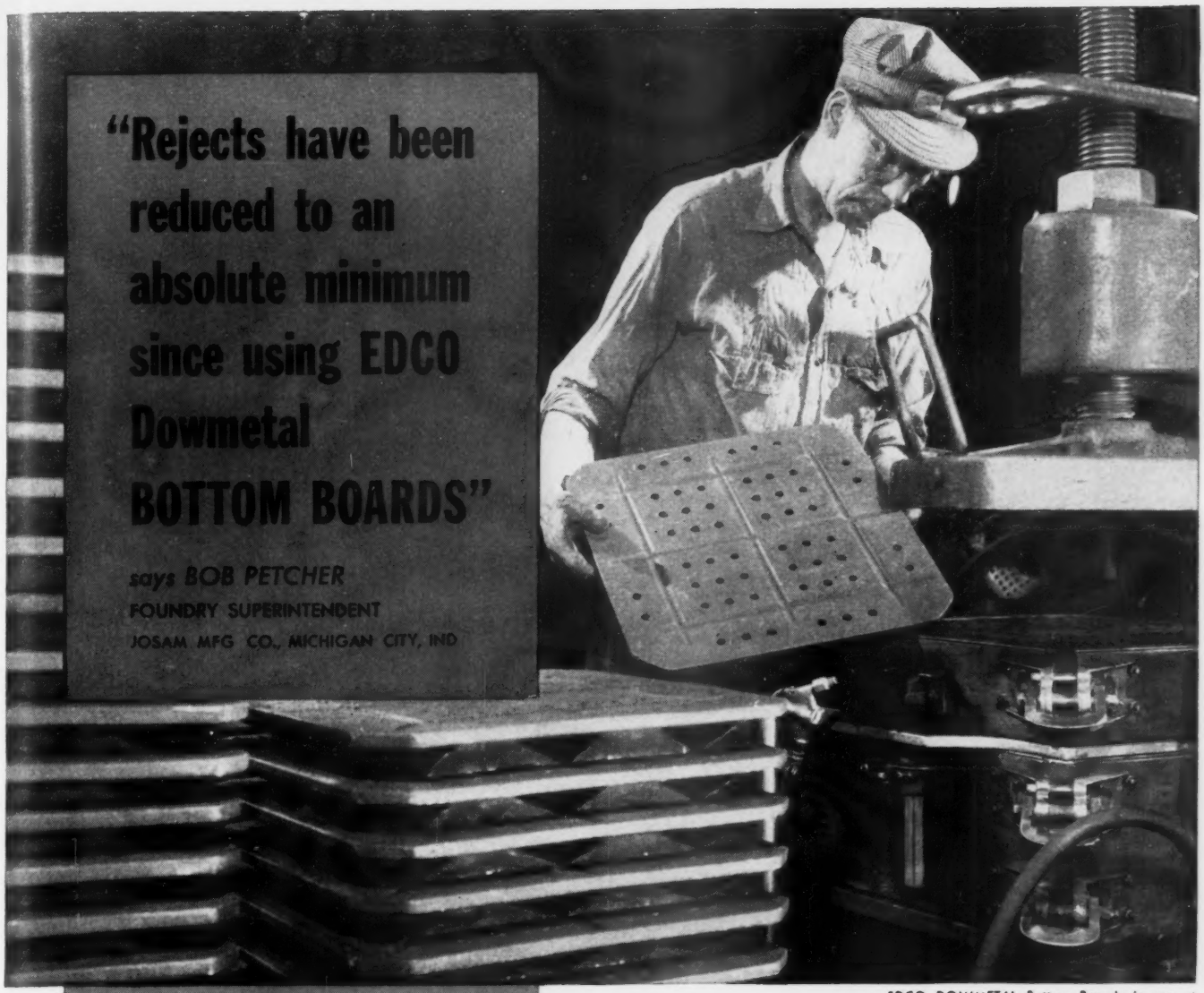
Still Serving: We have many "old timers" working in the foundry and related industries. One, who is known to many foundrymen is Frank Valtier of the Harry W. Dietert Co., Detroit, who, at 82, still works an eight-hour day, five days a week.

FRANK VALTIER

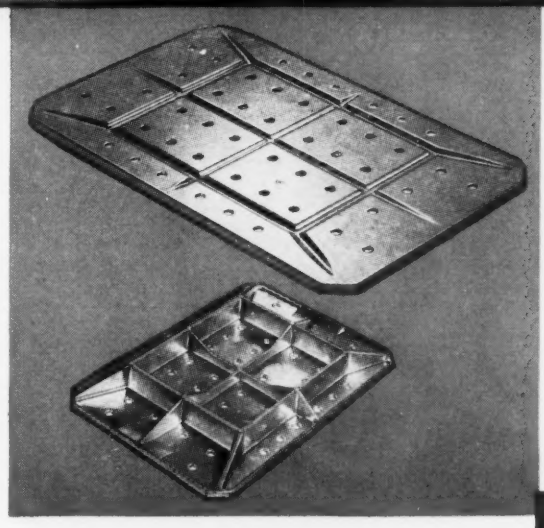
Frank has a long and interesting association with the foundry industry. In 1887 he arrived in New York as an immigrant, at the age of 17, and served his apprenticeship with the Otto Gas Engine Co., Philadelphia. Frank says that firm manufactured the first four cylinder gas engines in the country. After completing his apprenticeship, he had a variety of jobs, ranging over a period of time, from machinist to superintendent, with such organizations as Westinghouse, American Machine Co., Levering and Garregens, Otis Elevator, Goetz Co., Savage Arms Co., and Melborne Electric Co.

In 1922, Frank was production manager with Melborne Electric Co. when that organization was purchased by General Motors Corp., and he was transferred to the Works Managers Committee, Factory Production Engineering Section, of G.M. His chief responsibility was to institute a foundry control program and follow up new developments in foundry practice. In 1930 he joined Harry W. Dietert Co., where he has done much to produce practical sand testing equipment for universal foundry use.

Congratulations, Frank, on your service to the industry. F.G.S.


"Rejects have been reduced to an absolute minimum since using EDCO Dowmetal BOTTOM BOARDS"
says BOB PETCHER
FOUNDRY SUPERINTENDENT
JOSAM MFG CO., MICHIGAN CITY, IND

EDCO DOWMETAL Bottom Boards in use at Josam Manufacturing Company, world's largest manufacturer of plumbing drainage products



"Light, easy to handle, practically everlasting, EDCO DOWMETAL Bottom Boards have been a potent factor," says Petcher, "in improving our quality of castings and increasing our output.

"Our old wood boards had a life of about two weeks; and toward the end of their life-span, they always produced some poor castings which had to be rejected.

"EDCO Boards are just the opposite—they are *permanent equipment.* We've been using EDCO DOWMETAL Bottom Boards for more than four years—have used them almost 10,000 times—and they are still in perfect condition.

"These boards have paid for themselves many times over."

You, too, can save time, space and substantial cash sums by using EDCO DOWMETAL Bottom Boards.

They're easy to handle—light. They stack in small space, easily and securely. They last indefinitely—built for it.

Above all, like Josam, you get better castings, fewer rejects—a big saving.

Write us, or phone CApitol 7-2060 for price schedule and list of 78 standard sizes available from stock.

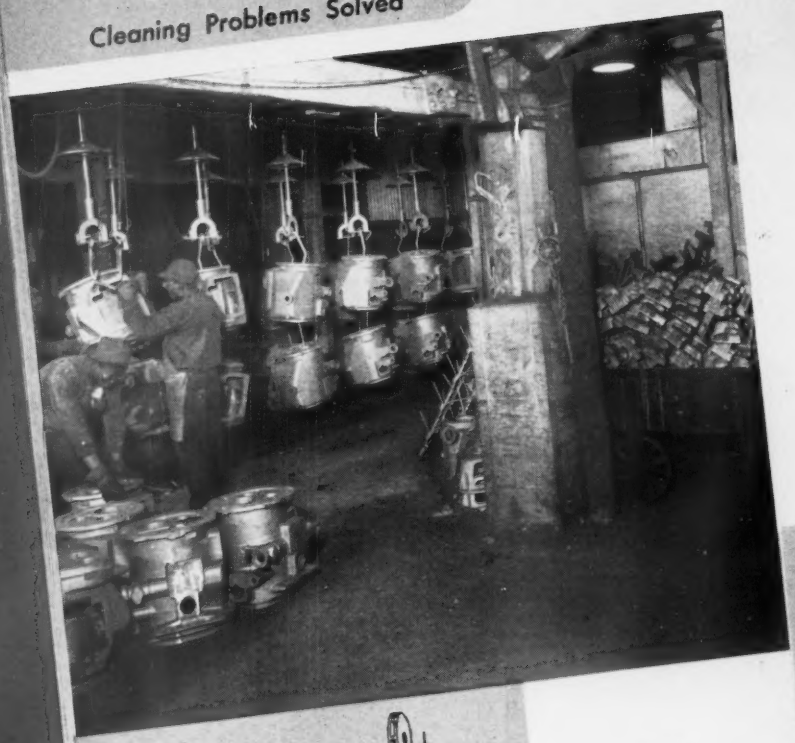
CHRISTIANSEN CORPORATION

1517 NORTH KILPATRICK AVE.
CHICAGO 51, ILLINOIS
ALUMINUM ALLOY INGOTS
ZINC BASE DIE CASTING ALLOYS

32 PAGES of PROOF that WHEE

GENERAL

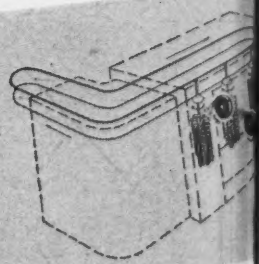
Cleaning Problems Solved

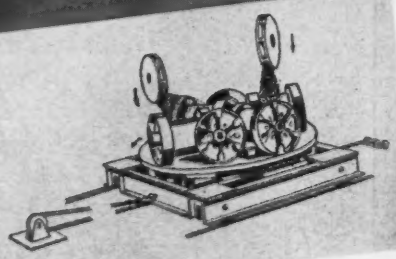


SAVES 50% IN CLEANING TIME

Gray Iron Castings

By installing this Wheelabra Monorail Cabinet — 2 pass, inde spinner-hanger type — SUPER FOUNDRY, INC. of Cleveland saved 15,000 man hours yearly in c ing approximately 10 tons of cas per hour. Cleaning time has bee creased 50% and the cost of repair has been reduced 40%. Prior to t stallation of the Wheelabrator C this plant was equipped with tumbling mills and two 14' blast





SAVES $7,310.00 PER YEAR

Glass Grinding Machine Castings

Large, bulky jobs that cost so much to clean in an airblast room are handled far more quickly and economically in a Car Type Wheelabrator Room. Convincing evidence is the operation of such a machine at LOVE BROS., INC., Aurora, Ill. which decreased cleaning room costs 36%. In cleaning just one type of casting, the 975 lb. runner bar for a glass grinding machine, a saving of $7,310.00 per year was effected. In addition, seven tons of large, heavy castings are Wheelabrated each day with approximately the same percentage of cost reduction.

22

send for your copy today

of Catalog No. 724 "Special Cleaning Problems Solved by Wheelabrator Cabinets."

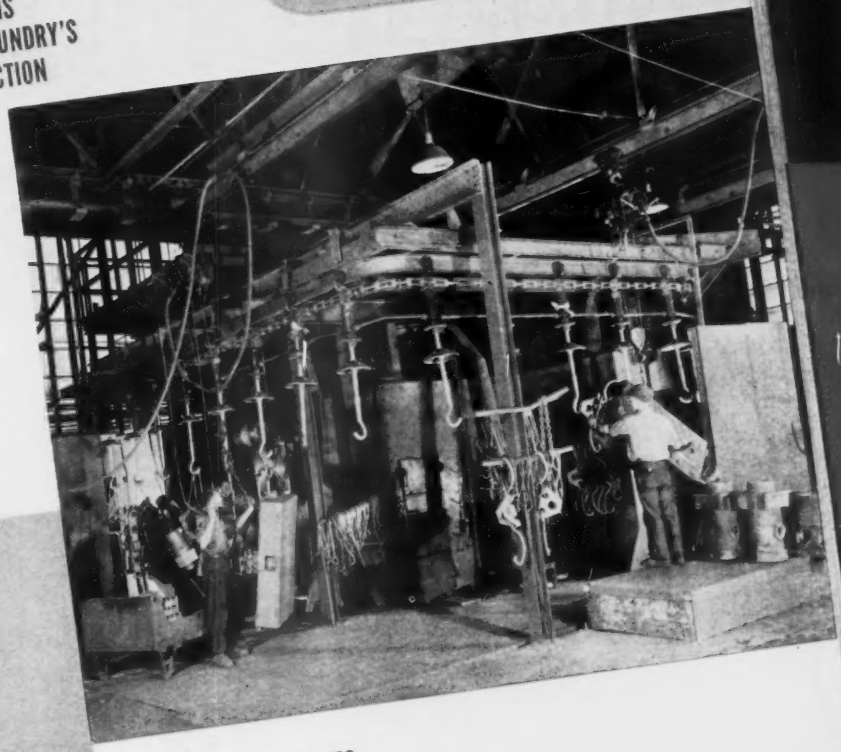
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

WORLD'S LARGEST BUILDE

EELABRATOR® speed cleaning costs less

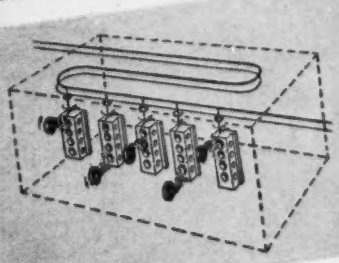
GENERAL
Cleaning Problems Solved

CLEANS
95% OF FOUNDRY'S
PRODUCTION

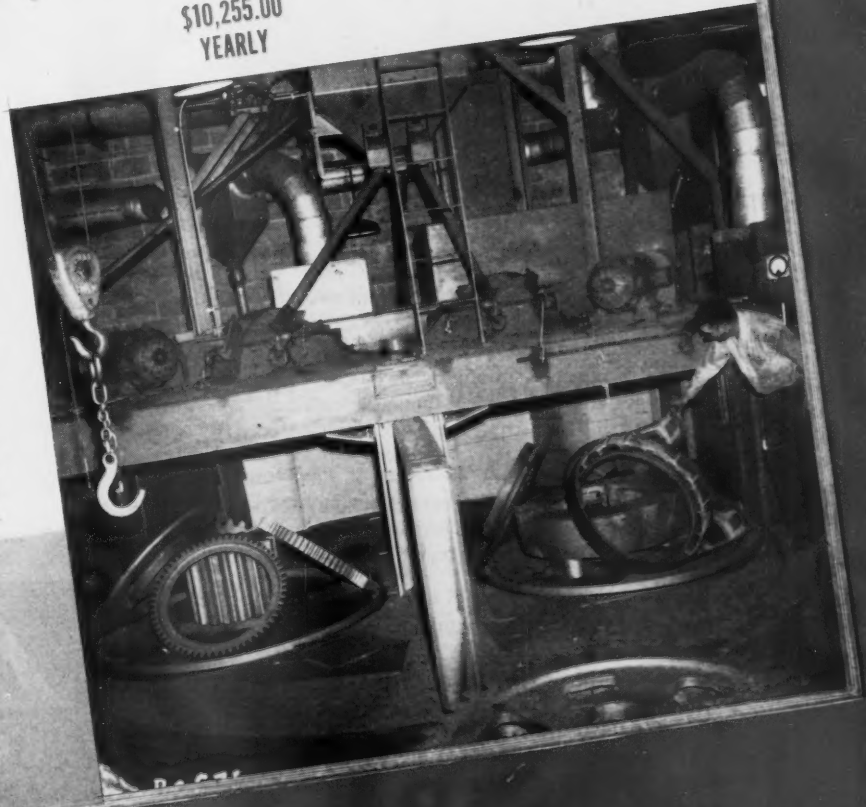


Gray Iron Castings

Although SPRING CITY FDRY. DIV., Waukesha, Wis. is a jobbing foundry, it operates on a production basis and cleaning room equipment has to be geared to fast, continuous operation. For this application, a Wheelabrator Monorail Cabinet — 3 pass, indexing, spinner-hanger type — with three Wheelabrator units, cleans over 95% of the foundry's production of green castings. Approximately half the tonnage is cleaned a second time to remove scale after heat treating.

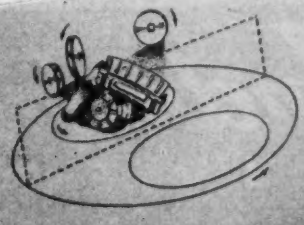


SAVES
$10,255.00
YEARLY



Steel Castings

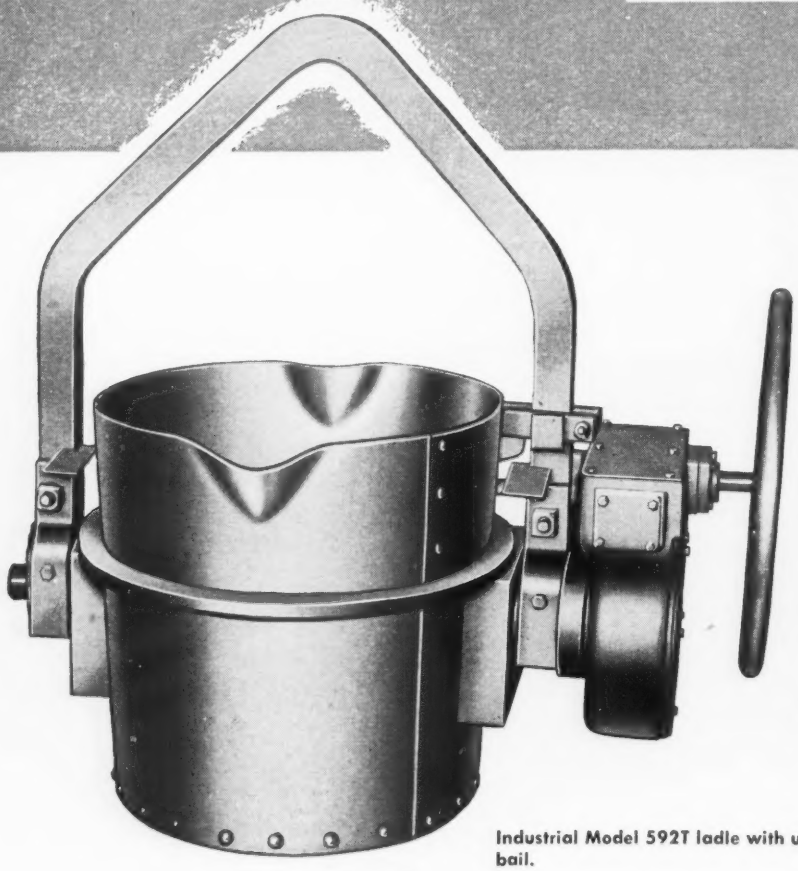
A direct, traceable saving of $41.10 every day in cleaning approximately 30 tons of castings . . . an annual saving of $10,275 . . . is effected with this Wheelabrator Twin Table, equipped with 72″ Twin Tables, at SAWBROOK STEEL CASTINGS CO., Lockland, Ohio. Castings are Wheelabrated three times: (1) in the green with gates and risers, (2) after annealing and (3) finish cleaning after grinding, welding, etc. Cleaning cost per ton of castings has been slashed from $4.75 per ton with airblast equipment to $3.38 per ton with the Wheelabrator.



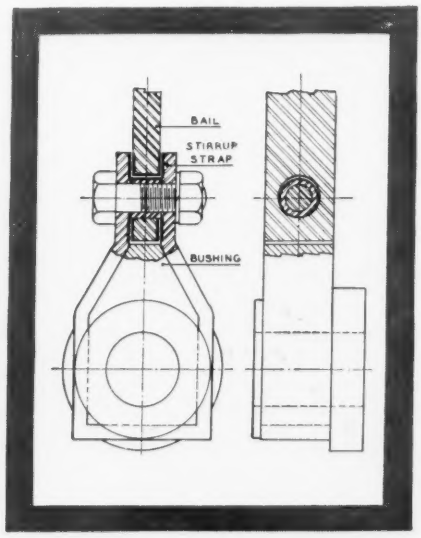
American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. Mishawaka, Indiana

...F AIRLESS BLAST CLEANING

It's True . . . Binding due to heat distortion COMPLETELY ELIMINATED in this revolutionary Universal Bail Design



Industrial Model 592T ladle with universal bail.



More flexibility than a universal joint. Ample vertical and horizontal flexibility. Misalignment taken care of by rotating swivel action.

Here is one of the really fundamental advances in geared ladle design. Binding problems caused by the steady rise in pouring temperatures have been solved . . . with no sacrifice in strength, safety, or simplicity.

You get four distinct advantages with this new universal bail by Industrial Equipment:

1. **Binding due to heat distortion is eliminated.**
2. **Binding due to misalignment is eliminated.**
3. **Gear wear due to binding is eliminated.**
4. **No lubrication or adjustment is ever needed.**

This new bail is the result of a project on which Industrial Equipment has been working for over four years. Many novel and ingenious designs were proposed and discarded before the final design was accepted. Like all good things it is simple. Yet notice that in addition to simplicity it is rugged, safe, and dependable.

You should also know that this new bail has been thoroughly foundry tested. We emphasize this because the more severe the conditions, the more evident was its design superiority. Operators, for example, say they have never operated a ladle that was easier to handle *regardless of conditions.*

Look to Industrial Equipment for the really basic improvements in foundry pouring and handling equipment. *Write, wire, or telephone today for full details.*

Do you have our revised catalog No. 35?

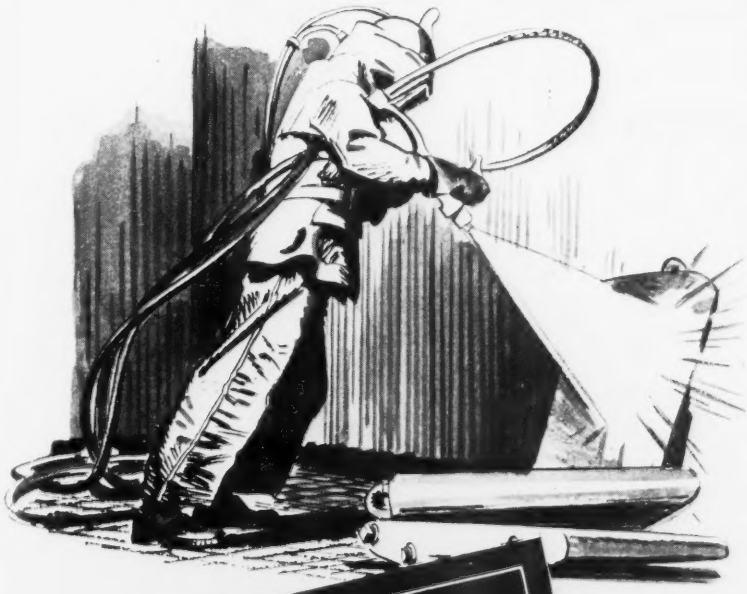
Industrial EQUIPMENT CO.

115 N. OHIO ST., MINSTER, OHIO

LADLES • BOWLS • SHANKS • BAILS • TONGS • SPECIAL EQUIPMENT

STOP ABRASION- with RUBBER LINING

and look what you'll save!



GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified
ARMADILLO CHUTE LINING to
resist Abrasion, Mild Acids, Moisture, Corrosives
A
Tire-tread stock
B
Fabric backing in one or two plies available; can be obtained vulcanized to metal backing

IN sand blast chambers, Armadillo Chute Lining has been used as a wall interliner, reducing maintenance costs as much as 75%—

the life of sand sluices and rock chutes has been multiplied as much as 12 times —

and wherever chute, trough or wall abrasion is a problem, Armadillo Chute Lining can cut *your* costs.

Reason for this outstanding resistance to abrasion is the compounding of Armadillo Chute Lining, as specified by the G.T.M.—Goodyear Technical Man. It is comparable in resistance and quality to the tread stock used in making premium-grade Goodyear tires—"tread-tough" to bounce away abrasion. It can be nailed, bolted or pegged into place — can be lapped, butted or spliced. Armadillo Chute Lining can be readily cut with a *water-lubricated* hand knife or power wheel or die-cut to fit unusual shapes.

On new or special applications of Armadillo, especially where corrosives or temperatures nearing 150° F. are involved, the G.T.M. is particularly ready to discuss your needs. You can reach him for these applications—as well as standard uses—by writing Goodyear, Mechanical Goods Division, Akron 16, Ohio.

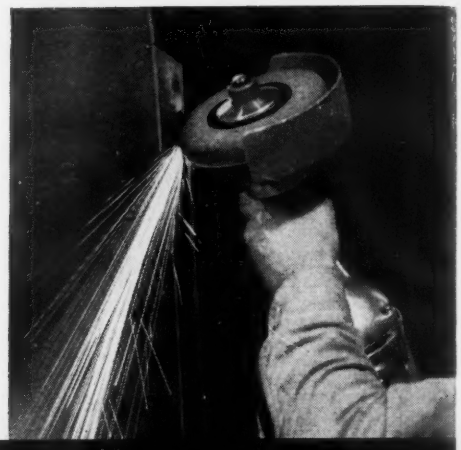
LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

Armadillo–T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



MANHATTAN PORTABLE WHEELS

are "Everybody's Favorite"

Manhattan Portable Wheels are the favorite with workers on incentive pay because they remove metal faster, resulting in more pieces done per shift. Management men, too, like Manhattan wheels because they do a quality production job at lower cost.

Individual engineering for every customer is the secret of success in Manhattan Wheels for portable grinders. Abrasive, density, bond—every phase of the wheel is specified for the work in your plant. That is why Manhattan Portable Wheels become "everybody's favorite."

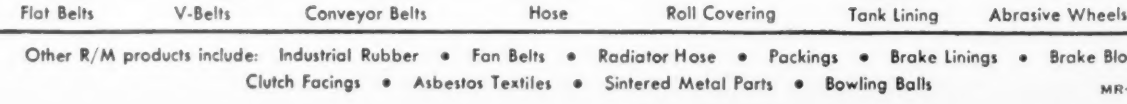
GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Flat Belts · V-Belts · Conveyor Belts · Hose · Roll Covering · Tank Lining · Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

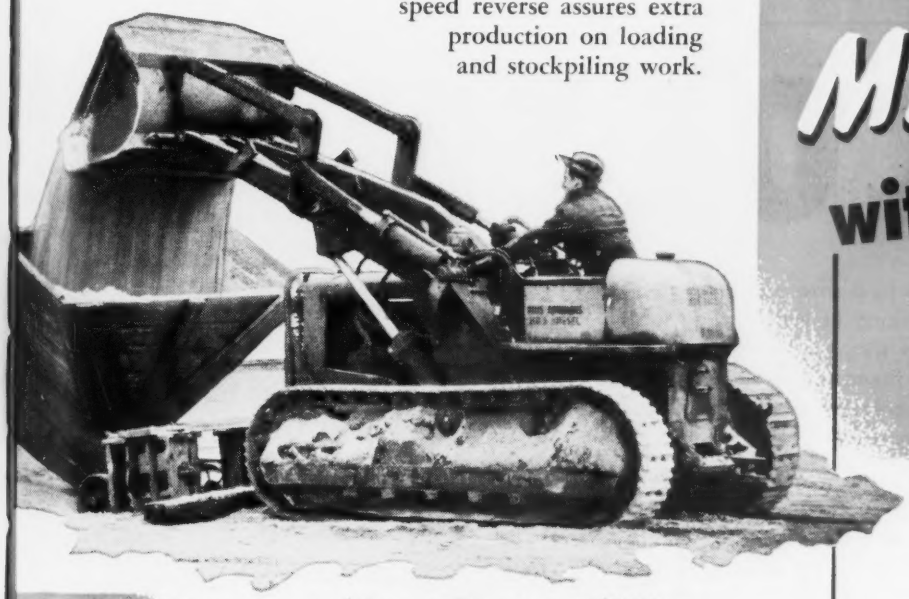
MR-826

how to MOVE MORE MATERIALS with less manpower, less equipment

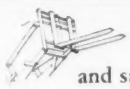
FOR HEAVY LIFTING, LOADING, TRANSPORTING—

Use the Allis-Chalmers Tracto-Shovel . . . Works Where Other Loaders Can't Operate

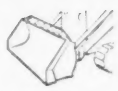
Use it for tough work in and around your plant . . . and on a variety of jobs, too. With quick-change attachments, the HD-5G becomes a fleet of machines in one . . . handles materials of all kinds — bulk, solid or packaged. Power, weight and traction enables this outfit to work in the toughest going. Exclusive 1000-hour lubrication of truck wheels saves 30 minutes greasing time a day. Two-speed reverse assures extra production on loading and stockpiling work.



ATTACHMENTS MAY BE INTERCHANGED IN ABOUT 20 MINUTES BY SIMPLY REMOVING 4 PINS



LIFT FORK skids, lifts and stacks packaged and palletized loads. Lifting height (under fork), 8 ft. 10 in.; capacity, 4,000 lb.



CHOICE OF FOUR BUCKETS Handle countless digging, loading, stockpiling and reclaiming jobs. Standard bucket, 1-yd. capacity. Also 2-yd. Light Materials Bucket, ¾-yd. Narrow Bucket and 1-yd. Rock Bucket.

CRANE HOOK for heavy-duty service. Lifts, carries and unloads. Capacity, 5,000 lb. Lifting height, 11 ft. 6 in.

OTHER ATTACHMENTS: Straight and Angledozer blades, Trench Hoe, Tine Fork, Rock Fork, Drag Bucket, Teeth for all buckets.

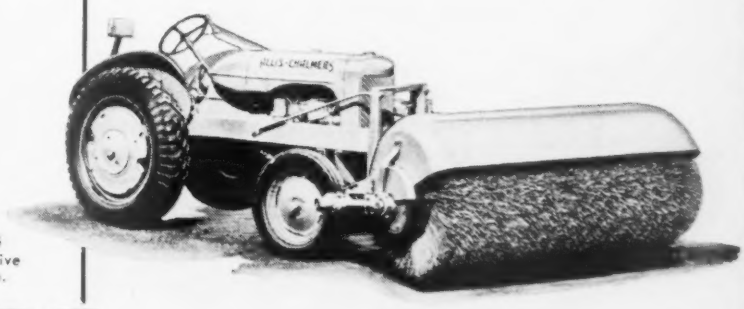
Now the same basic design . . . the same versatility that make the HD-5G Tracto-Shovel so useful is available on all four models of modern Allis-Chalmers Tractors.

1-yd. HD-5G	2-yd. HD-9G	3-yd. HD-15G	4-yd. HD-20G
40 drawbar hp.	72 drawbar hp.	109 drawbar hp.	Torque Converter Drive 175 net engine hp.

FOR HAULING AND SWEEPING—

Use the Allis-Chalmers IB

Built low, fast, powerful, the IB is the ideal industrial wheel tractor. It hauls trailers easily and safely up steep ramps, through narrow aisles, over railroad tracks and rough planking. Runs on less than a gallon of fuel an hour in average operation. Equipped with crane, the IB lifts, moves and spots loads up to 2,000 lb. With easily-attached sweeper, it removes snow, dirt or trash quickly.



ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

leading foundrie

select

COLEMAN

There is a Coleman Oven to help give you maximum production on every core baking or mold drying job —regardless of the size and shape of your castings. Coleman Ovens in leading foundries from coast-to-coast are proving vital in increasing casting tonnage at low cost...with less man power!

It will pay you to investigate how Coleman Ovens can solve your baking and drying problems. Our 50 years of engineering experience is available without obligation.

BAKING AND DRYING TIME REDUCED regardless of size and shape of cores and molds, increasing turnover of plates, dryers, and flask equipment.

MOST EFFICIENT HANDLING METHODS for your type of work and plant conditions...eliminate delays and losses.

PERFECT CORE BAKING ends manpower and casting losses due to make-overs and rejects.

PERFECT MOLD DRYING for true-to-pattern castings and easy cleaning.

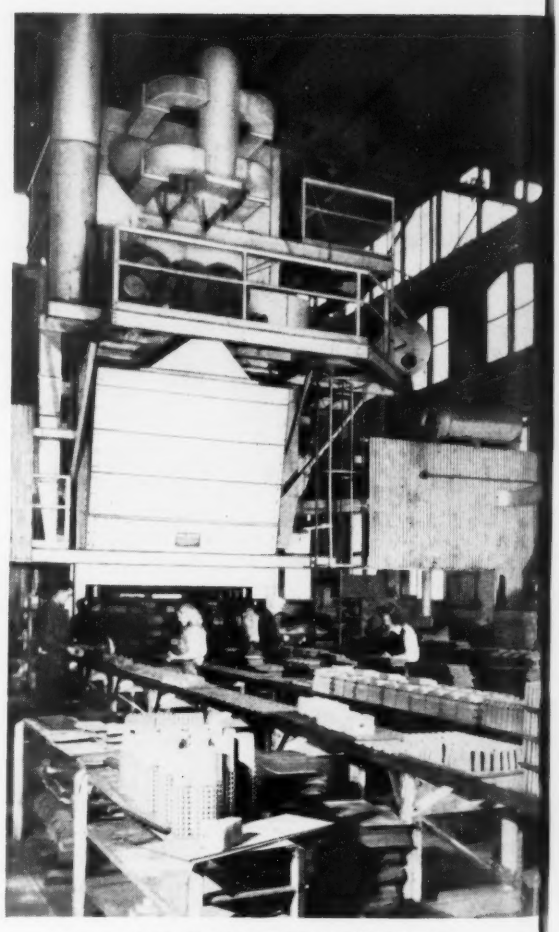
INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

HEAVY DUTY CONSTRUCTION for continuous dependable performance, economical operation, and minimum maintenance cost.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

SAVE BINDER. Proper core baking atmosphere and uniform temperature permit important savings in conventional binders.

USE HIGH SPEED CORE BINDERS. Coleman Ovens have uniform temperature and accurate control to handle temperature-sensitive resins and pre-baked oils.



COLEMAN TOWER® OVEN

Eastern Malleable Iron Company, Wilmington, Delawar

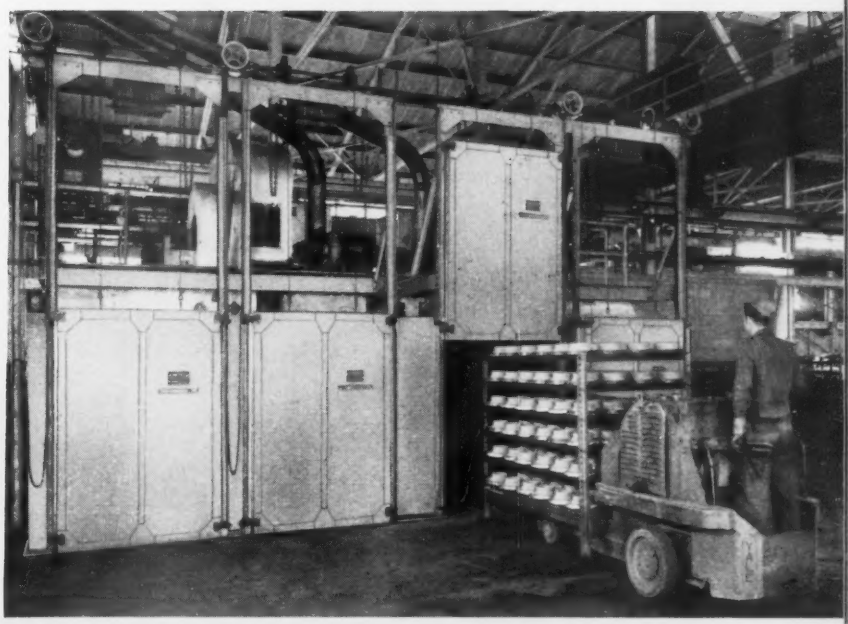
A COMPLETE RANGE OF TYPES:

COLEMAN OVENS are built in a complete range of sizes and capacities for every core baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

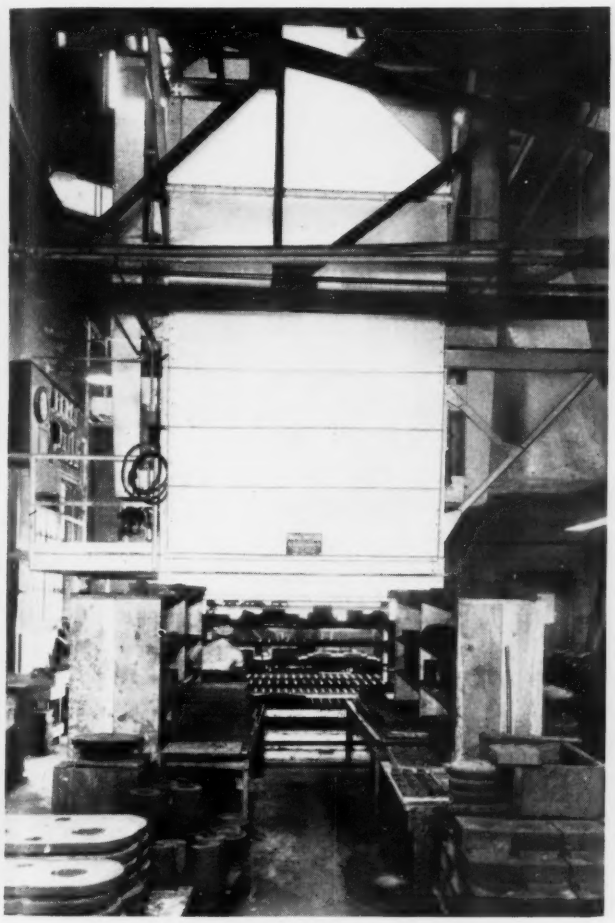
Write for Bulletin 48

from coast to coast

OVENS



COLEMAN TRANSRACK CORE OVENS
United States Pipe & Foundry Company, Decoto, California.



COLEMAN TOWER® OVEN
National Supply Company, Springfield, Ohio.

COLEMAN CAR-TYPE MOLD OVEN
The Bullard Company, Bridgeport, Connecticut.

THE FOUNDRY EQUIPMENT CO.

1831 COLUMBUS ROAD — CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

PRODUCTO MACHINE COMPANY

Needed a fabricated foundry flask offering

1. Unusual strength and rigidity for handling large, heavy castings.
2. Custom fabrication to their requirements.
3. Equipment ready for use on reaching foundry.
4. Less maintenance over a period of time . . . thus lower cost in long run.

. . . And Here's Why They Selected Heavy Duty

BS&B Foundry Flasks

Producto Machine Company, Bridgeport, Connecticut, has super-exacting requirements for any foundry flask they use. This large, grey iron foundry has used various weights and styles of BS&B Foundry Flasks for years. For operations like the one shown here the BS&B Heavy Duty Flask met their specifications . . . casting columns for the Bridgeport Turret Miller they manufacture. They have been replacing cast iron flasks with the BS&B Heavy Duty fabricated flasks because they realize that in recommended sizes the fabricated flask is ready for service when it leaves the BS&B factory. It does not crack. And it calls for less maintenance and lower cost over a period of time. This is no mere theory—BS&B Heavy Duty Flasks have *proved* it, with year-in-year-out performance for heavy-duty flask users all over the country!

Why not see for yourself what BS&B's features can mean in added capacity and low cost?

BS&B makes the only Heavy Duty Flask combining all these advantages: (1) Welding of bearing strips continuously both inside and out; (2) Cast steel trunnions; (3) Cast steel pinlugs and clamplugs. Let your nearest BS&B representative show you how these features and BS&B construction standards can make you, too, feel "Well Pleased!"

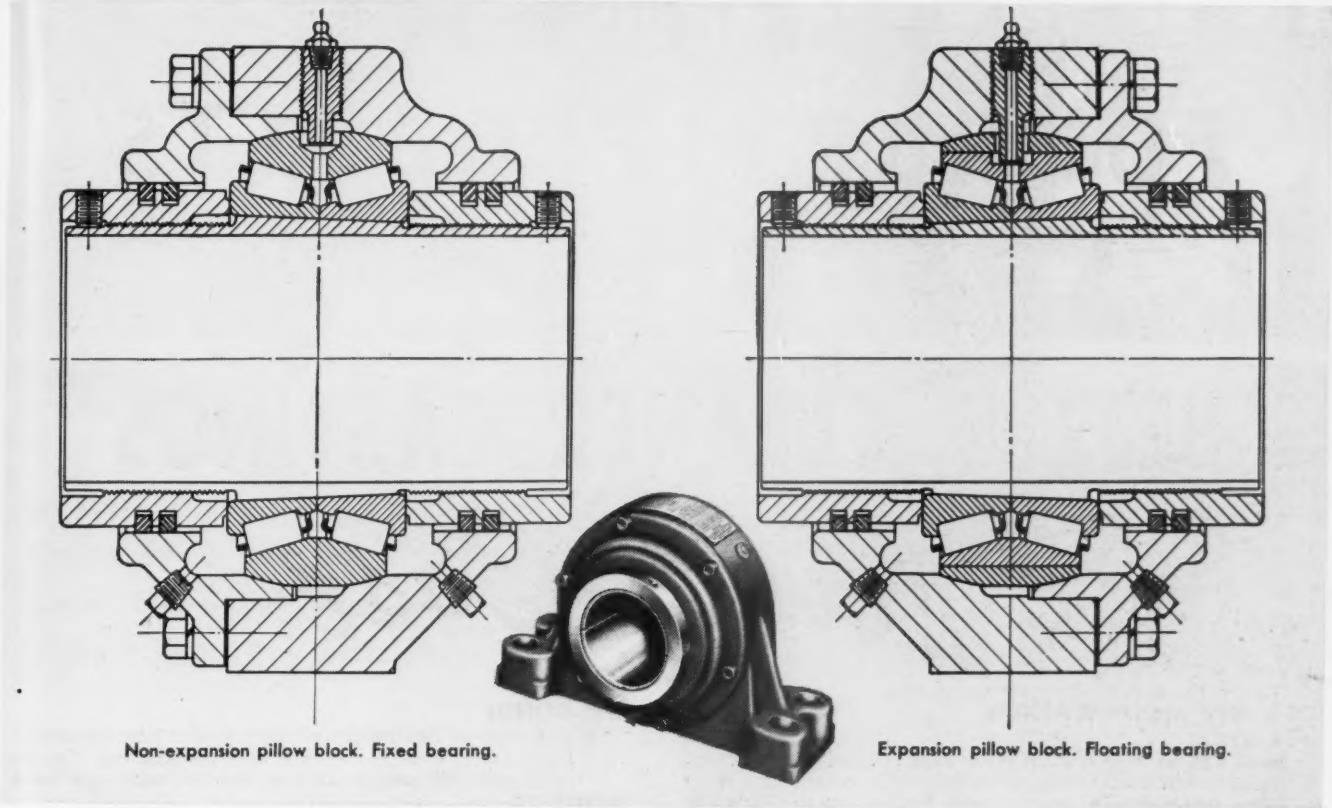
Write for FREE BS&B Foundry Flask Handbook. A handy catalog and useful foundryman's "bible" . . . includes easy-to-order system.

Foundry Flask Division—Dept. 7-ARIO

FOUNDRY
OUR 60TH YEAR
BS&B
FLASKS

BLACK, SIVALLS & BRYSON, INC.
7500 East 12th Street **Kansas City 3, Missouri**

NEW TIMKEN® BEARING PILLOW BLOCK



Non-expansion pillow block. Fixed bearing.

Expansion pillow block. Floating bearing.

First application of new tapered bore TIMKEN® bearing makes new Dodge-Timken pillow block more compact

IT takes up less space. It weighs less. Yet the new Dodge-Timken® All-Steel pillow block has tremendous load-carrying capacity.

It's the result of the combined achievements of the Dodge Manufacturing Corporation, Mishawaka, Indiana, and The Timken Roller Bearing Company and makes use of an entirely new Timken bearing. Never before has a self-aligning, non-adjustable tapered roller bearing with tapered bore been used in pillow blocks.

Being of all-steel construction, this new Dodge-Timken pillow block is more compact and fills a real need where space is a factor. It is available in both expansion and non-expansion designs. And it incorporates all the advantages of Timken tapered roller bearings.

Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings load-carrying capacity to spare. Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the machinery with which the pillow blocks are used.

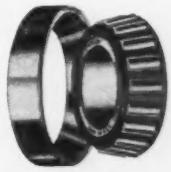
When you install new Dodge-Timken pillow blocks, you can expect dependable performance because the bearings are the best. No other bearing can give you all the advantages you get with Timken bearings. Specify them for all your other machinery, too. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ⊡ AND THRUST —⊡— LOADS OR ANY COMBINATION —⊡—

DELTA FOUNDRY PRODUCTS

SPEED PRODUCTION OF BETTER, CLEANER CASTINGS AT Lower Cost

CORE AND MOLD WASHES:

FOR STEEL:

Delta Special Core & Mold Wash Base — Used by more steel foundries than all other types of washes combined.

Delta SteelKoat — a finished high fusion waterproof wash.

FOR ALL TYPES OF SAND CAST METALS:

Delta ThermoKoat — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.

Delta Z-Koat — a zirconium wash with unusual properties in contact with molten metal.

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:

Delta GraKoat — no reaction with molten metal.

Delta BlacKoat — a black wash, free from carbon, no gas in contact with molten metal.

FOR GRAY IRON:

Delta BlacKoat S-5 — a new and different wash. Produces results, on gray iron castings, unequalled by any other wash.

FOR NON-FERROUS AND LIGHT METALS:

Delta NonferrusKoat — produces unusually smooth surface castings.

PARTING COMPOUNDS:

Delta Partex — (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.

Delta Liquid Parting — Low-cost, highly effective and lasting.

MUDDING & PATCHING COMPOUNDS:

Delta Sliktite — a light colored mud for all types of metal castings.

Delta Ebony — a black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

NO-VEIN COMPOUND:

A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

MOLD SURFACE BINDERS—LIQUID:

Delta Spray Binders — Produce dry sand mold results by surface spraying of green sand molds.

PERMI-BOND:

Eliminates Sea Coal Nuisance: The new modern scientific sea coal replacement.

DRI-BOND:

A new type of Dry Binder which provides new economies. Fast-baking, reduces veining and penetration. Can be used with old sand equally as well as with new sand.

BONDITE: Produces a reducing mold atmosphere:

For Steel and Gray Iron — Use Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

96-B SAND RELEASE AGENT:

Another Foundry *"First"* by Delta. By adding 8 oz. or less per ton to your core or molding sand mixes, your sands will flow freely. 96-B is completely volatile at elevated temperatures and does not contaminate the sand.

CORE ROD DIP OIL NO. 224X:

Ties core rods and wires into the cores:
Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

DELTA SAND CONDITIONING OIL:

Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixers.

CORE OILS:

High tensile, low gas, faster baking, exceptionally economical to use.

Get the Facts...

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

CARL-MAYER MOLD OVEN at Oil Well Supply Co., Oil City, Pa.

They put Big MOLD OVEN Jobs up to CARL-MAYER

• • •

In Carl-Mayer design there is verification of our outstanding engineering know how—and your ensurance of highest operating efficiency.

One of our most recent large mold oven installations (shown at right) was chosen against several competitive makes—and its performance has won high praise from the owner.
For the biggest payoff, contact Carl-Mayer on your next job.

• • •

We build all sizes of Core and Mold Ovens, also other types of Industrial Ovens and furnaces. *Write for Bulletins 141 and 350.*

• • •

CARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

CARL-MAYER MOLD OVEN at Union Steel Castings Div. of Blaw-Knox Co. Door Clearance: 17'9" wide, 15' high. Depth: 40'. Capacity: 200 tons per bake. Combination Gas-Oil fired.

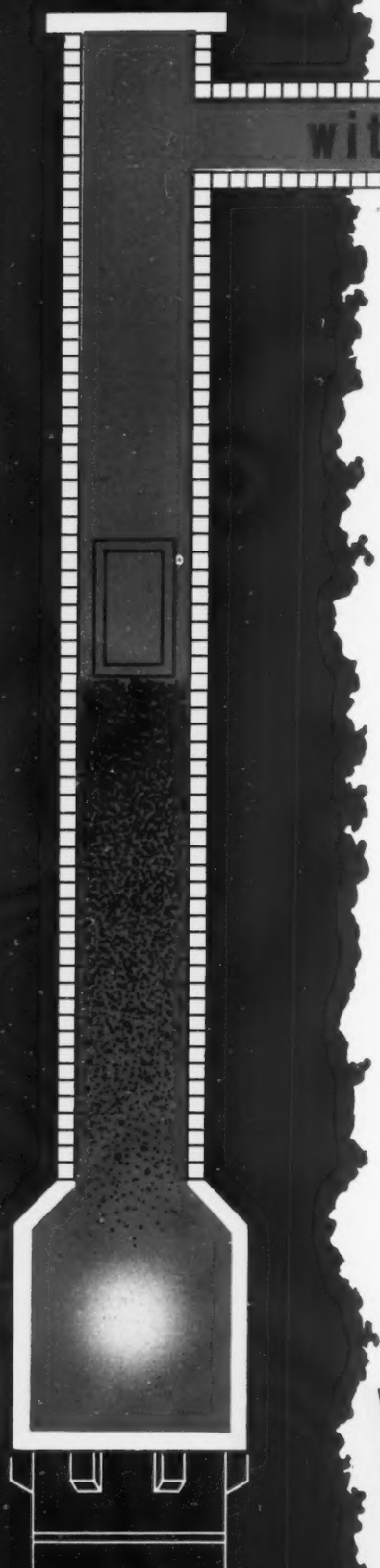
THE CARL-MAYER CORP.

3030 Euclid Ave., Cleveland, Ohio

Over 30 Years' Experience

FOUNDRY CUPOLA FUME . . . . Completely Controlled

with a WHEELABRATOR® DUSTUBE® SYSTEM



Atmospheric pollution from foundry cupolas need no longer be a problem. Wheelabrator Dustube cupola fume control systems provide virtually complete removal of fume, discharging only clean gas to the atmosphere. Collection efficiencies meet the most stringent air pollution codes.

Dustube Collectors provide
* continuous automatic operation
* efficiency to meet all codes
* low initial investment

The Wheelabrator Dustube system at Lincoln Foundry Corp. is the most modern and efficient cupola fume control system now operating in the strictly controlled Los Angeles area. A certificate of approval, without restrictions, from the Los Angeles County Air Pollution Control Board attests to the high efficiency of the system.

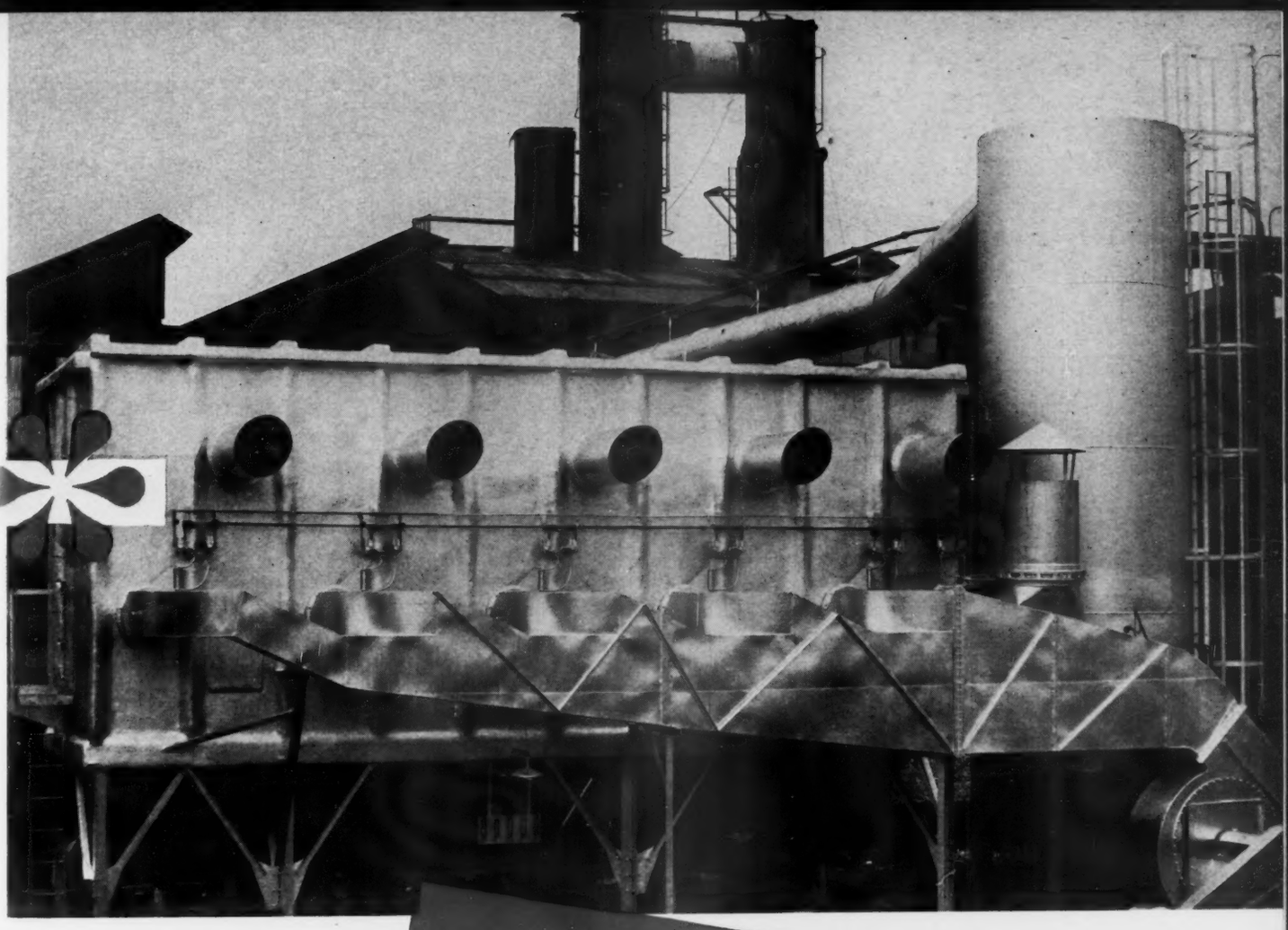
This installation has eliminated the discharge of solids from the single 78″ OD cupola lined to 54″ ID operated by that progressive foundry. Use of Wheelabrator's synthetic fabrics in this Dustube Collector makes it possible to handle the cupola gases at high temperatures. In addition the fabric has the high tensile strength and abrasion resistance required for automatic mechanical shaking.

Each Wheelabrator Dustube installation is individually engineered for the particular job. Our Engineering Department is at your service.

Why not call on them to help solve your particular problem today?

Write for your free copy of Bulletin No. 352 on Wheelabrator Dustube systems for foundry cupola fume control.

THE AMERICAN MOLDER



AIR POLLUTION CONTROL DISTRICT
COUNTY OF LOS ANGELES

PERMIT

IS HEREBY GRANTED TO
LINCOLN FOUNDRY CORPORATION
TO OPERATE
LOCAL EXHAUST SYSTEM, 2-STAGE EVAPORATIVE COOLER, AND 5 UNIT AMERICAN WHEELABRATOR BAGHOUSE SERVING A 54" I.D. GRAY IRON CUPOLA.
LOCATED AT
2525 East 49th Street
Vernon, California
SUBJECT TO THE FOLLOWING CONDITIONS

NONE

THIS PERMIT DOES NOT AUTHORIZE THE EMISSION OF AIR CONTAMINANTS IN EXCESS OF THOSE ALLOWED BY DIVISION 20, CHAPTER 2, ARTICLE 5, OF THE HEALTH AND SAFETY CODE OF THE STATE OF CALIFORNIA OR THE RULES AND REGULATIONS OF THE AIR POLLUTION CONTROL DISTRICT.

DATE: April 23, 1952
Appl. No. 3461

REVOCABLE AND NOT TRANSFERABLE

No 5024

GORDON P. LARSON, DIRECTOR
By _____ Office Manager

POST NEAR OPERATING EQUIPMENT

(above) Dustube cupola fume control system installation at Lincoln Foundry Corp.

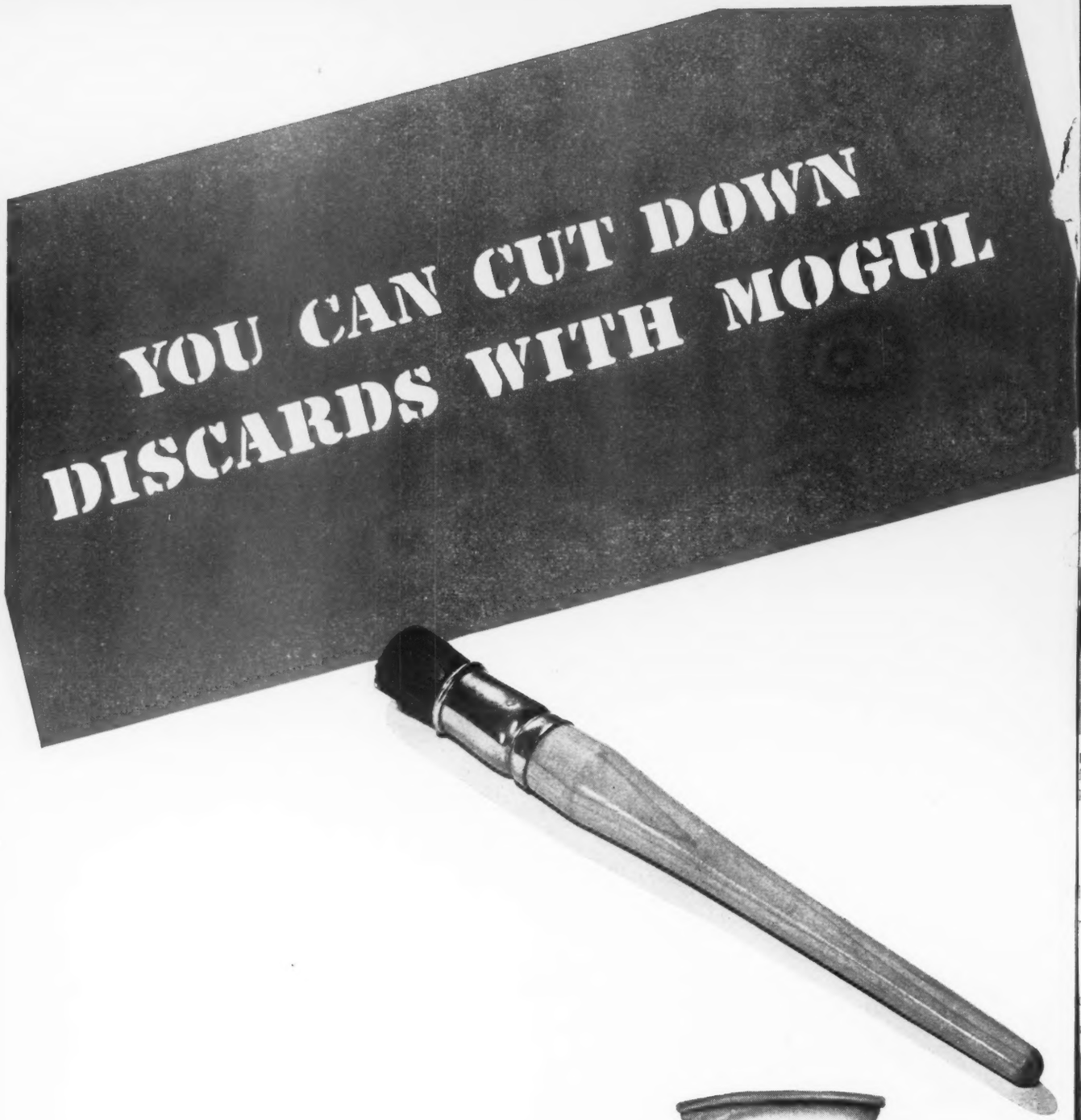
(at right) Certificate of approval from the strict Los Angeles County Air Pollution Board.

American

WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

YOU CAN CUT DOWN DISCARDS WITH MOGUL



LARGEST SELLER IN THE FIELD!

Kordek, the preferred dry bond for cores . . .

• CUTS DRYING TIME • MAKES SMOOTHER CORES

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.

NORTON WHEELS FOR FLOORSTAND GRINDING can be obtained which are just right for the metal being ground, the spindle speed, the amount of metal to be removed and the pressure to be applied.

Keep the cutting *clean and free* when grinding malleable iron!

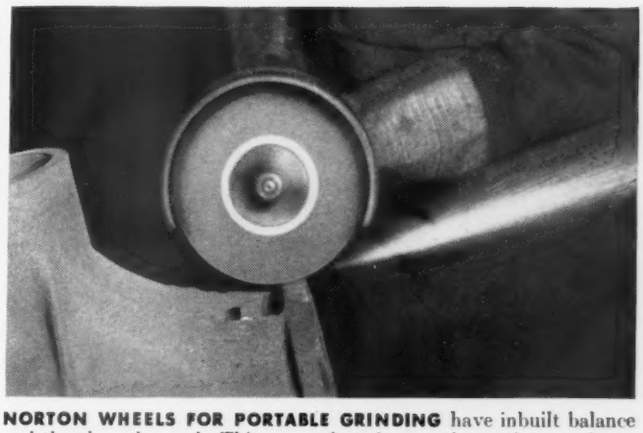
It's the key to lowest costs and highest production rate

The real trick in keeping costs under control in grinding both annealed and unannealed malleable iron is putting the right wheel on the job.

Actually, this is no trick at all because for low speed machines, Norton has available a variety of vitrified bonded wheels in ALUNDUM* or CRYSTOLON* abrasive (treated) and for high speed operation the same wide selection of resinoid bonded wheels. For each job there is the correct range of grain size, grade and bond to get maximum free cutting action.

YOUR NORTON DISTRIBUTOR GIVES GOOD ADVICE

Your Norton Distributor can supply both the wheels and the know-how to help you fit the right wheel to your work. For very special jobs he can bring in the local Norton abrasive engineer. Write direct for the 55-page publication, "Rough Grinding." It will prove a mine of valuable information. Norton Company, Worcester 6, Mass. Distributors in all principal cities — see your classified telephone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



NORTON WHEELS FOR PORTABLE GRINDING have inbuilt balance and thus hug the work. This means fast, free cutting action, good production and low cost.

NORTON
ABRASIVES
Making better products to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

READY-MADE

Solutions to SPECIAL Dust Problems

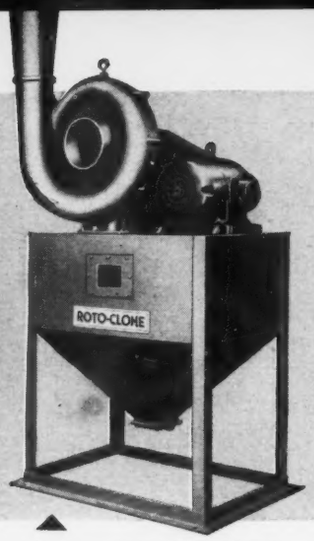
ROTO-CLONE'S WIDE RANGE OF DESIGNS PERMITS TAILORING SYSTEM TO YOUR SPECIFIC NEEDS AT STANDARD EQUIPMENT COST.

We know from 20 years' experience that no two dust problems are exactly alike. That's the reason for the wide, diversified line of Roto-Clone* equipment pictured here. Every one of these designs was at one time a "special"—tailor-made to solve a specific dust-control problem. Today, they are *standard* items which may be adapted readily and economically to scores of applications.

Every dust problem is still a "special" to AAF engineers—but the solution will likely consist of just that right combination of proven Roto-Clone features which, because they are "standard," means savings to you of both time and money.

Run over your list of dust-producing operations. Pick out the "problem child" of the lot, then call your local AAF representative. From our 20 years' experience and the world's most complete line of dust-control equipment, we're certain to come up with the right solution at the right price.

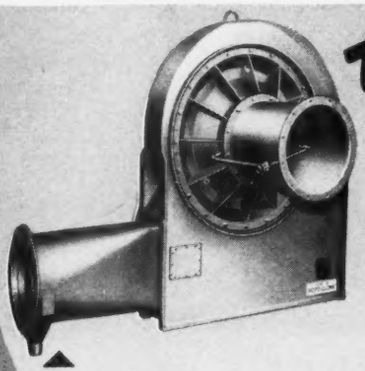
**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*



Type D mounted on hopper which serves both as storage container and separating chamber for removing dust from secondary air circuit.

type D ROTO-CLONE

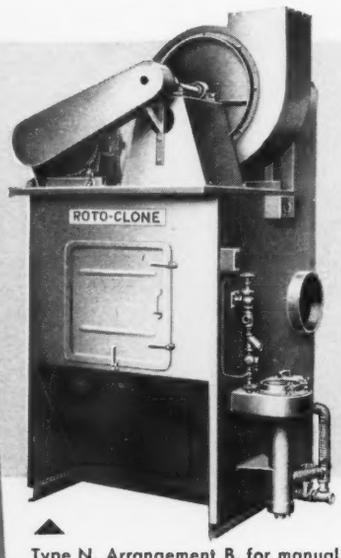
This dynamic precipitator co bines the functions of exhaus and dust separator in a sing unit. Its wide acceptance as dry collector of granular proce dust is due to many factors- ease of installation, compact d sign, trouble-free performan and uniform high efficiency dust separation.



Type W, Arrangement A. Designed for lighter dust loads, it features smaller space, high collection efficiency and lowest cost.

type W ROTO-CLONE

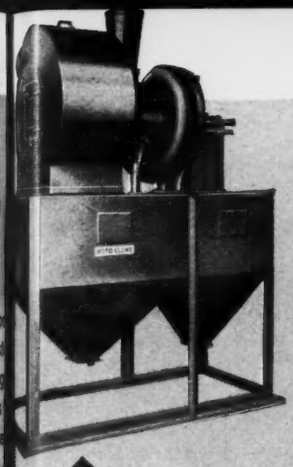
A dynamic precipitator whi by the addition of a movi water film on the collecting s faces, extends its high clean efficiency to the collection of lightest and finest dust partic eliminates wear from abras and delivers the collected d as a sludge for easy dispo or reprocessing.



Type N, Arrangement B, for manual removal of sludge from small capacity Roto-Clones. Sloping side of reservoir speeds cleaning operation.

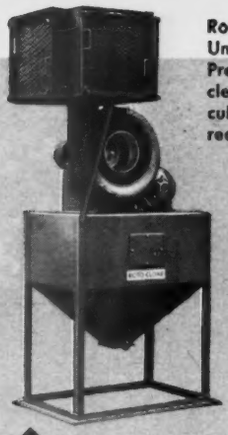
type N ROTO-CLONE

This hydro-static precipitator tains its high cleaning efficien from the scrubbing and cen fuging action in the impell and thorough intermixing water and dust-laden air. Wa recirculation is obtained with pumps or other moving par Removal of the collected ma rial as a sludge or slurry el inates secondary dust proble



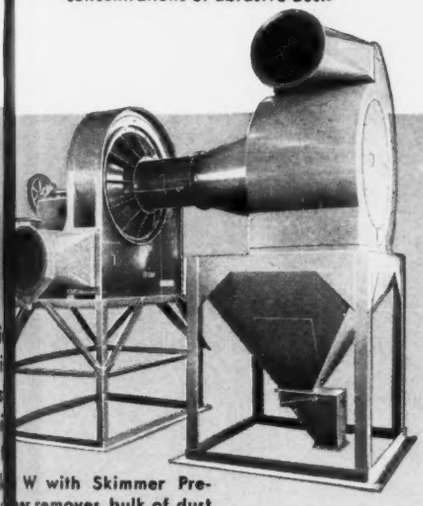
Type D with Skimmer Precleaner for handling exhaust air containing chips or heavy concentrations of abrasive dust.

Roto-Clone Self-Contained Unit exhausts, separates and stores the dust plus filters the air before return to workroom.



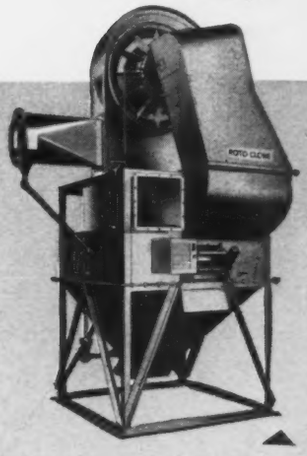
Type D with Filter Aftercleaners extends Self-Contained Unit advantages to larger exhaust volumes.

Roto-Clone Self-Contained Unit Model R includes both Precleaner and Cycoil Aftercleaner. Cycoil permits recirculation of cleaned air and requires infrequent servicing.

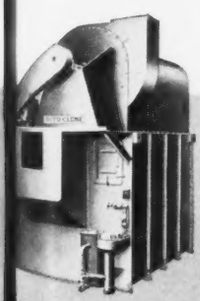


W with Skimmer Pre-er removes bulk of dust for salvage; remaining as sludge or slurry.

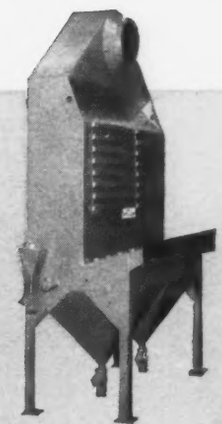
Type W, Arrangement D, with Wet Precleaner and hopper designed with sludge drain for continuous disposal of heavier dust loadings as slurry.



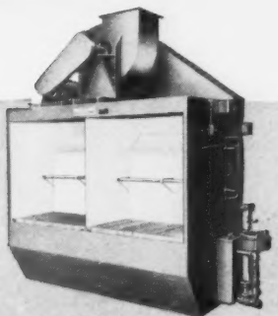
Type W, Arrangement C, with Wet Precleaner and Automatic Sludge Ejector. The most complete dust-control unit ever devised regardless of dust loading.



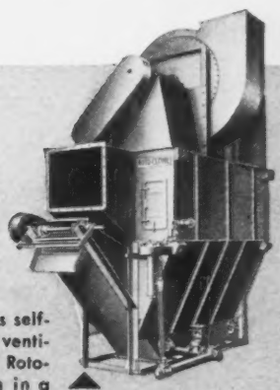
Type N, Arrangement B, for manual removal of sludge from large capacity Roto-Clones. Flat bottom design increases sludge storage space.



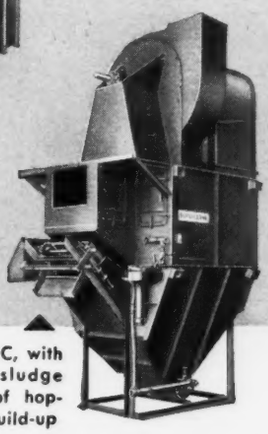
Type N, Arrangement X. Special adaptation of Type N Roto-Clone for collecting explosive dusts.



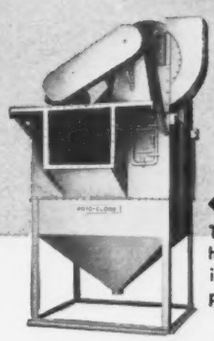
Type N Bench—provides self-contained downdraft ventilated workbench and Roto-Clone dust collection in a single, compact assembly.



Type N, Arrangement C, with Type L automatic sludge ejector is provided in large capacity Roto-Clones to keep overall height to a minimum.



e N, Arrangement C, with e W automatic sludge ctor. Steep walls of hop-prevent material build-up



Type N, Arrangement D, with hopper designed for sluicing collected material to process or disposal point.

American Air Filter

COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky

erican Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California

IT'S *Actually* THE MULTIPLE WASHING ACTION THAT MAKES THE MULTI-WASH *so efficient!*

The Schneible patented Vari-vane construction gives the *extra* washing action that makes Multi-Wash dust control systems outstanding in efficiency and low cost operation.

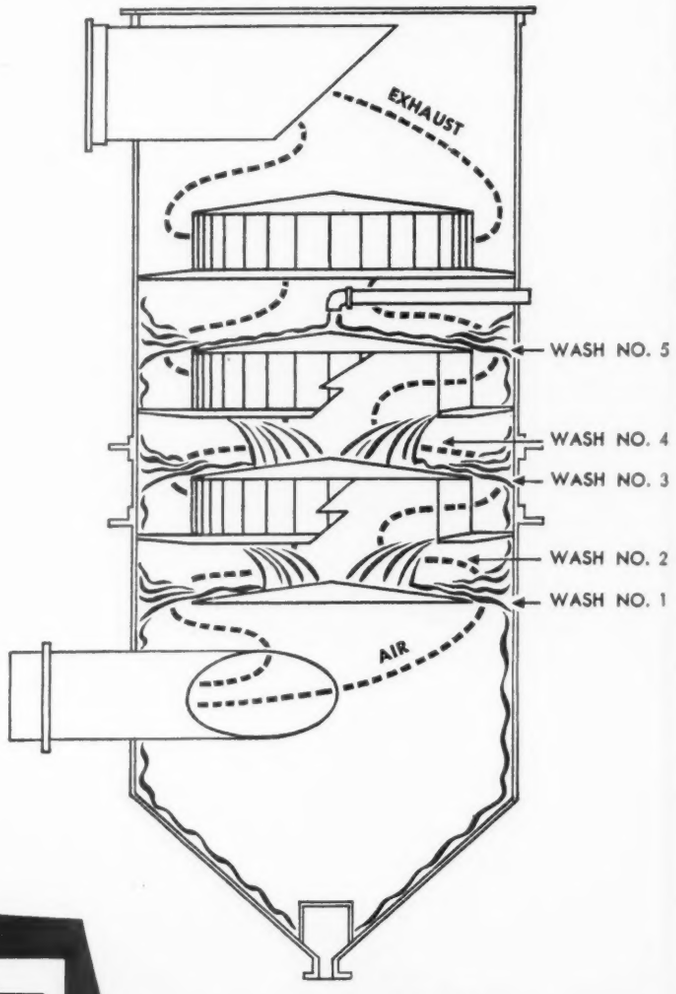
The cutaway diagram shows a type JC—2½ stage collector. Each impingement stage provides two washes of incoming dust-laden air, plus one at the bottom deflector plate, or five separate washes. This thorough scrubbing removes ordinary dust particles down to the two micron range, which drop to the sludge cone and then go to the dewatering tank.

For each impingement stage that is added, two extra washes are provided, increasing the efficiency and allowing the collection of finer particles down to sub-micron ranges.

It's easy to see why Multi-Wash is preferred by foundrymen who insist on the utmost in efficiency with lowest maintenance cost!

Your local Schneible representative can help you provide better dust control, or write direct for complete information.

Cross-section diagram of type JC Multi-Wash collector showing 5 points of washing action. The type IC with 4½ impingement stages provides 9 washes while the HC with 6½ stages gives a total of 13 washes for removal of extremely fine particles.



SCHNEIBLE

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

CLAUDE B. SCHNEIBLE COMPANY • P. O. BOX 81, NORTH END STATION • DETROIT 2, MICHIGAN

Late Foundry News

SEPTEMBER 25, 1952

SAND TARIFFS CUT: Freight rates on foundry sand shipped in closed cars will be reduced 18 to 50 cents a ton by a recent Interstate Commerce Commission decision. The ICC order reinstates former relationships between open car and closed car rates. These relationships, upset by general rate increases, were: For distances up to 200 miles, closed car rates not more than 15 per cent higher than open car rates; for distances over 300 miles, equal rates for both type cars. The new prescribed rates mean reductions of 18 to 43 cents a ton on shipments of 55 to 250 miles. On shipments of 300 miles and over the savings will be 49 or 50 cents. The order is effective Oct. 24 and is expected to stand, although the railroads have until Oct. 16 to file an appeal. Largely responsible for instigating the ICC action were the National Industrial Sand Association; its executive secretary, Vincent P. Ahearn, and its Traffic Committee headed by Emery Durstine, Keener Sand & Clay Co., Columbus, O.

ARMOR CASTINGS: Steel foundries have been asked by Army Ordnance to recommend ways and means of providing additional production capacity of 1500-pound and heavier armor castings for tank hulls and turrets. The proposed increase is in addition to the extensive program Ordnance already has under way for establishing armor casting capacity at several foundries. In general, it is expected the additional capacity can be attained by expanding existing plants rather than building new ones. No problems are foreseen at present in production of lighter steel armor castings.

PIG IRON UP: The OPS order raising ceiling prices on pig iron $2.50 to $3 a ton became effective Sept. 4. However, the increases may be applied to all deliveries made on and after July 26. The $2.50 boost affects pig iron with maximum silicon content of 4.99 per cent. Silvery iron (5 to 17 per cent silicon) is up $3.

SQUEEZE IS ON: While foundries are authorized to pass on to their customers the higher cost of raw materials, including pig iron, wage boosts are putting the big squeeze on profits. The Gray Iron Foundry Industry Advisory Committee recently told OPS that wages constitute about 50 per cent of gray iron prices, and that latest wage increases average about 10 per cent. This doesn't include the cost of fringe benefits also granted.

PRICE RELIEF: The only available method for increasing ceiling prices of castings to compensate for higher wages is to apply the industry-wide earnings standard. This would permit what price increases, if any, are necessary to bring earnings up to 85 per cent of the best three of the four years 1946-1949. Foundries maintain that a survey to develop necessary facts for applying the industry earnings standard would take too much time to give the immediate relief needed; OPS says it has a new procedure that will speed up the job.

WRONG BASE: Steel foundries maintain that the 1946-1949 base period for determining price adjustments is not equitable because the industry was in a depressed condition at that time. Advisory committee of the industry recently was told by OPS that an alternative base period might be determined that would more equitably represent normal operations; however, to do this would require a careful study of operating, sales and production data. A subcommittee is to be appointed to advise OPS on a preliminary survey.

PIG IRON INVENTORIES: Exceptions to the 30-day inventory limit on pig iron are being permitted by NPA when necessary to encourage efficient operation of blast furnaces by allowing them to make uninterrupted runs on special grades of iron. Thus, requirements of special analysis irons in some cases are being anticipated for several months ahead. Foundries accumulating excess stocks of special grades are not permitted to build up stocks of regular grades.

MATERIAL SUPPLIES: Aluminum and copper supplies under existing controls now are sufficient to meet all important needs of both defense and civilian production, according to the Conservation Division of DPA. Its "List of Basic Materials and Alternates" puts both copper and aluminum for the first time in the group of materials in approximate balance between supply and demand. Heavy gray iron and steel castings and high-alloy steel castings continue among materials in short supply, while malleable iron and light gray iron castings are classified as being in fair to good supply.

NPA SHRINKING: In line with the contraction in certain NPA departments, the Foundry Equipment and Supplies Section likely will be abolished. Frank E. Fisher, section chief, is expected to leave that post Oct. 20. However, the industry will have representation through George P. Fisher, who has worked with the section and who will continue as a consultant to the Metalworking Equipment Division.

NFA OFFICERS: Officers elected at the National Foundry Association's recent annual meeting are: President, W. Summerfield Brunk, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa; vice president, W. W. C. Ball, Taylor & Fenn Co., Hartford, Conn.; treasurer, E. B. Sherwin Chicago Hardware Foundry Co., North Chicago, Ill.; executive secretary, Edward J. Walsh. Full

report on the meeting will be presented next month.

FRENCH TEAM: Members of the new team of American foundry specialists the Mutual Security Agency will send to France about Nov. 1 have been selected. The group, formed at the request of the French foundry industry to provide additional managerial and technical assistance, includes: Ralph R. West, West Steel Casting Co., Cleveland; Earl J. Smith Jr. and J. S. Gallagher, Ford Motor Co., Dearborn, Mich.; G. L. Mercer, Frank L. Crobaugh Co., Cleveland; Victor A. Baldwin, International Heater Co., Utica, N. Y.; Charles F. Walton, Case Institute of Technology, Cleveland; Ray L. Wormley, U. S. Radiator Co., Detroit; Harry Oldham, Sutter Products Co., Dearborn, Mich.; Harry B. Swan, former Cadillac Motor superintendent. C. E. Seaman and L. E. Roark, who have been with MSA in Europe in recent months, also will work with the group, the former as team leader.

STEEL CASTINGS: NPA is issuing new instructions to steel foundries for their guidance in filling out Form 1-18A. The form is used to provide NPA with data on castings production. Customers of steel foundries who find themselves without CMP tickets for fourth quarter—an aftermath of the steel strike—are advised to work through their CMP claimant agency to adjust the matter.

GRAPHITE AND ELECTRODES: Allocations of artificial graphite and carbon electrodes during fourth quarter will be on the same quantity, size and shape basis as third quarter authorizations. Consumers of 500 pounds or more per quarter of these materials are required by Oct. 15 to file revised Form NPAF-97 concerning their third quarter use of graphite and electrodes.

MISCELLANY: Accelerated tax amortization certificates approved recently include $46,850 for the Metal Mold Corp., Darby, Conn., and $172,472 for Jas. H. Matthews & Co., Pittsburgh . . . A 5 per cent increase in price ceilings on refractories is expected to be ordered by OPS . . . J. M. Forman has succeeded J. A. Porter as assistant chief of the Foundry Branch, Copper Division, NPA . . . Milwaukee Bronze Casting Co., Milwaukee, has been sold to the Taylor-Button Co., former coal firm of that city. New plant manager is E. A. Schneidewind, formerly superintendent, Milwaukee Flush Valve Co. . . . Meehanite Metal Corp. has been granted exclusive right in North and South America by Crofts Engineers Ltd. of England to enter into agreement with companies for use of the latter's device for charging loose borings into the cupola, also to install the equipment.

PRICES OF FOUNDRY METALS AND COKE

(As of Sept. 25, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.50
New River	20.80
Wise County	15.95
OVEN	
Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.80
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$57.00	$57.50
Birmingham	51.38	....
Buffalo	55.00	55.50
Chicago	55.00	55.00
Cleveland	55.00	55.00
Everett, Mass.	59.75	60.25
Fontana, Calif.	61.00	....
Geneva, Utah	55.00	....
Granite City, Ill.	56.90	57.40
Lone Star, Tex.	51.00	51.00
Neville Island (Pittsburgh)	55.00	55.00
Steelton, Pa.	57.00	57.50
Swedeland, Pa.	59.00	59.50
Toledo, O.	55.00	55.00
Troy, N. Y.	57.00	57.50
Youngstown, O.	55.00	55.00

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.00c. Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.62½c, delivered.

ZINC: High grade 15.35c, delivered. Die casting alloy 18.50c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

Mr. Production is high man...

Illustration: Mr. George Garvey of City Pattern and Foundry, South Bend, Indiana observing the checking of an "ACCURATE" cope and drag set for an M. B. Skinner Co. 12" split coupling used for repairing broken cast iron mains.

WITH ACCURATE PRESSURE CAST COPE AND DRAG SETS

QUICK DELIVERY

By Air Freight, Parcel Post, Special Delivery or Railway Express. Pick-up and delivery by jobber representatives in the following areas:

AUBURN, MASS.
Henry A. Kottmann
Telephone: Auburn 2683

MILWAUKEE, WIS.
John M. Donohue
Telephone: HIlltop 2-7130

NORMAL, ILL.
Clarence C. Schmidlin
Telephone: Normal 8551-5

LOS ANGELES, CALIF.
McGowan Company, Inc.
Telephone: Trinity 2057

OAKLAND, CALIF.
General Foundry Service Corp.
Telephone: KEllog 3-3381

Foundries everywhere are looking for means to increase production and lower their costs. ACCURATE cope and drag sets have helped to solve this problem for hundreds of the leading foundries from coast to coast.

ACCURATE cope and drag sets have clean smooth partings and patterns as cast, are straightened, and have alignment points. This will substantially reduce your finishing costs.

Maximum over-all plate dimensions for cope and drag sets are 54" x 64" and 48" x 80".

Why not use this profit making idea in your foundry? Write for catalog No. 515.

ACCURATE MATCH PLATE COMPANY
1847 WEST CARROLL AVENUE CHICAGO 12, ILLINOIS
Telephone SEeley 3-7918

FOR QUICK, ECONOMICAL

USE STERLING FOUNDRY

FOR FASTER SWING FRAME GRINDING

"THE WHEELS OF INDUSTRY"

STERLING GRINDING WHEELS

Plus VALUE ABRASIVE PRODUCTS FOR

- BETTER GRINDING
- FASTER GRINDING
- LOW COST GRINDING

THE STERLING GRINDING

OF THE CLEVELAND

REMOVAL OF MORE METAL

SNAGGING WHEELS....

These special abrasive units handle easier . . . withstand the shocks and strains of modern snagging operations.

OR LOW
ST STAND
RINDING

● For rough, fast metal removal, Sterling's Foundry Grinding Wheels are ideal. Careful study of the correct proportions of special abrasive grains and bonds to use for each job has resulted in a line of better-than-usual wheels that last longer, and provide more and faster grinding. They do their job readily without undue pressure of the wheel against the work... use every abrasive grain to the limit of its cool-cutting capacity. There is no wasteful grinding when Sterling's "Wheels of Industry" are on the job.

Operator fatigue is minimized by careful selection of the proper wheel for your particular job. In competitive tests, Sterling Foundry Grinding Wheels outperform other brands... a test in your cleaning room will quickly prove the superior performance provided by these abrasive units. Write or phone us today for the free services of a Sterling engineer, skilled by years of experience in solving foundry grinding problems. No obligation!

BEST IN THE TEST—THAT'S STERLING

● During a test recently conducted on snagging nodular iron castings for jet engines, a Sterling 20 x 2 x 10 grinding wheel, specification JA143 P8 BFC, provided five days life in comparison with only three days supplied by a competitive wheel. The Sterling unit required a minimum of dressing, and its high quality was such that this manufacturer replaced the other brands with Sterling's "Wheels of Industry". For profitable snagging and longer wheel life, specify Sterling and be certain. We will show you how easy it can be done.

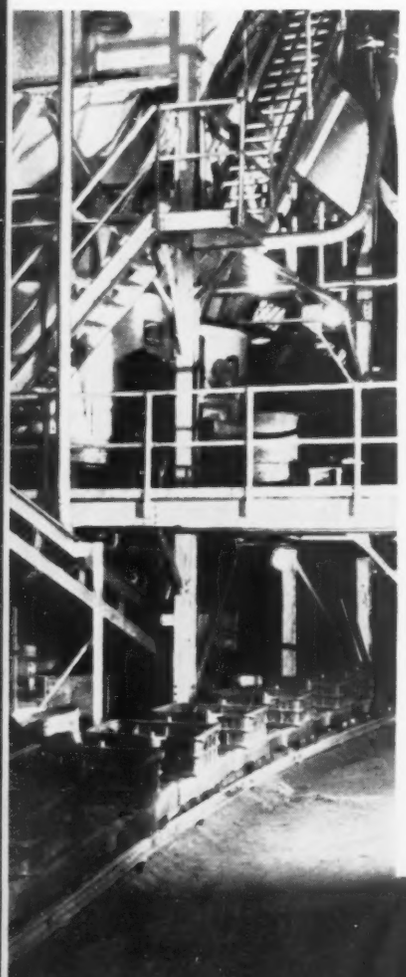
Ask for These Free STERLING Research and Development Folders...

● These free folders are an important data file for you on all types of grinding. Whatever your problem, there is a solution to be found in this interesting literature prepared to make wheel selection quick and easy. Included with these folders is the popular "The Art and Science of Grinding". Write us on your letterhead and we will gladly send your file immediately.

WHEEL DIVISION TIFFIN OHIO
QUARRIES COMPANY

SIMPSON *Intensive* MIX-MULLERS HELP *Studebaker* DOUBLE THEIR FOUNDRY PRODUCTION...

NATIONAL ENGINEERING COMPANY is especially proud of their part in furnishing TWELVE Simpson Intensive Mix-Mullers and other sand handling equipment for Studebaker's latest modernization program.



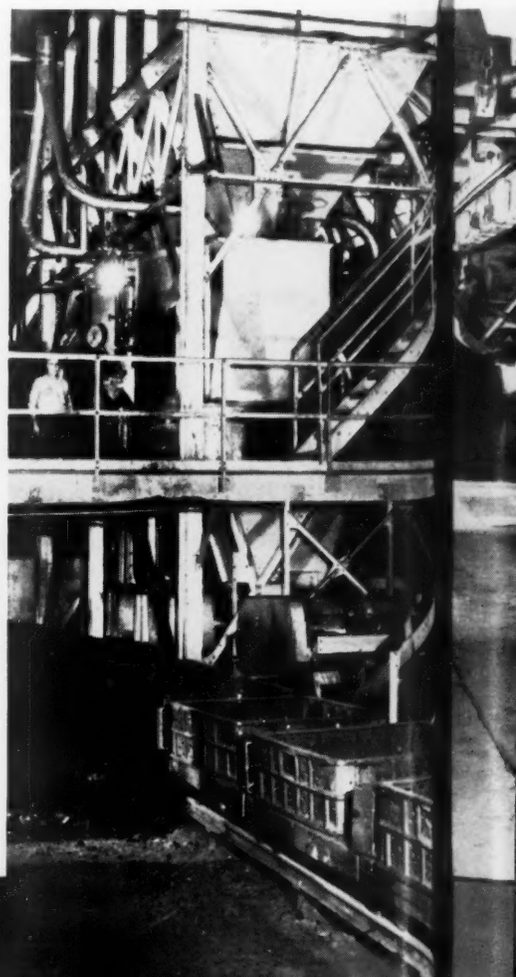
Consider these impressive results and you'll see why:

Casting production stepped up 100%, with no loss of working time—Working conditions materially improved and previous bottlenecks eliminated—Reduction in man-hours per ton—Plant efficiency and handling operations further mechanized and simplified—all of which add up to a new high standard of foundry operation in this famous South Bend plant.

In your own foundry, as at Studebaker, the quality *and* quantity of finished castings is largely dependent upon the correct, controlled preparation of your sand. You may not need the big tonnage output of 12 Simpson Intensive Mix-Mullers . . . but whatever your requirements, there is a Simpson model which will assure top production and top quality that your finished product must have.

Write for Bulletin 511 on the new 2F and 3F Simpson Mix-Mullers . . . or Bulletin 507 which describes the Simpson "Utility" unit for mechanizing smaller foundries.

Shown at the left and right are two groups of two No. 3 Simpson Intensive Mix-Mullers fed by overhead hoppers in Studebaker's molding sand operation.



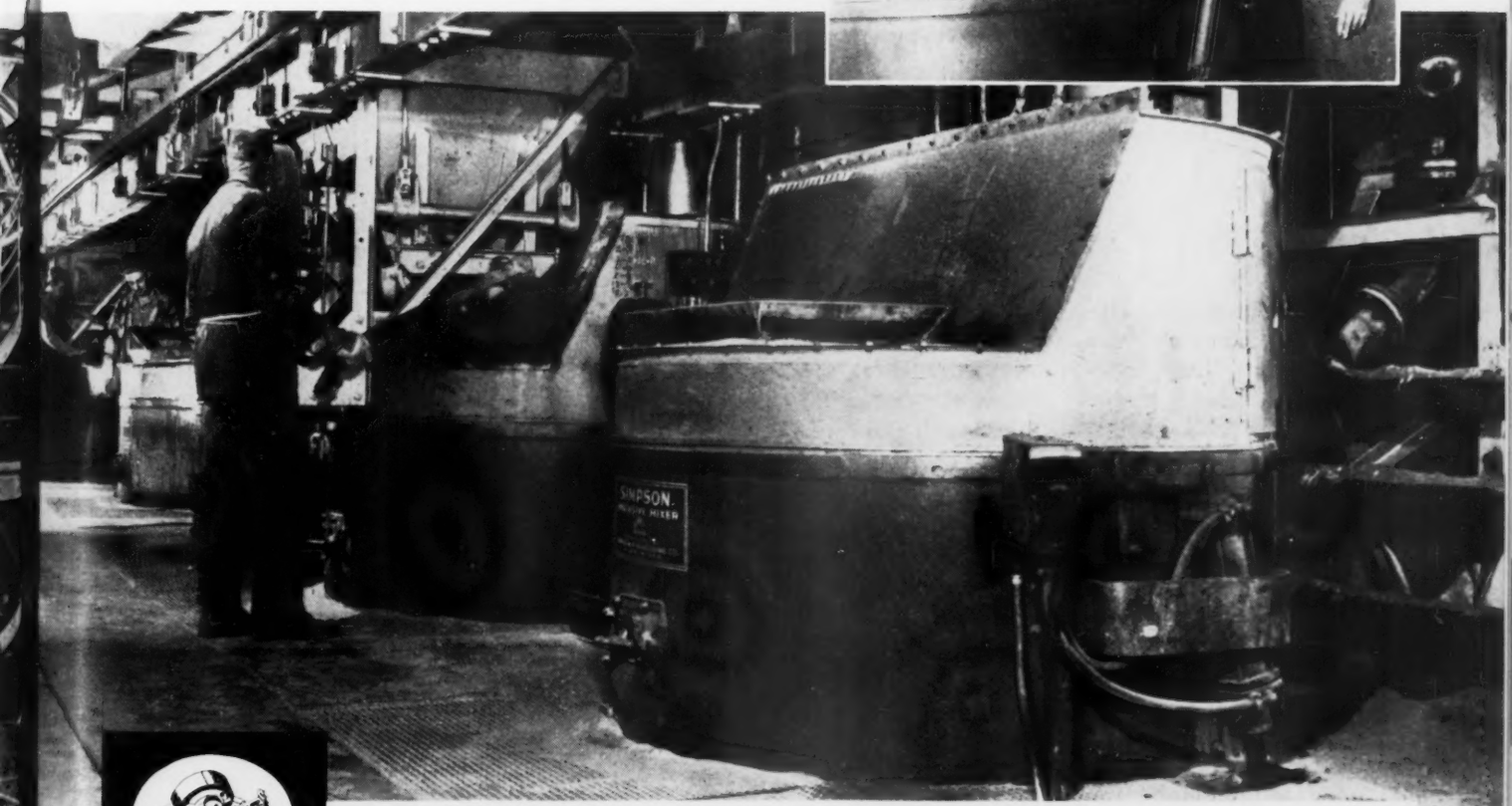
12 SIMPSONS

provide quality core and molding sand for modernized South Bend gray iron foundry

TOP: Two more of the six No. 3 Simpsons used for properly conditioning molding sand at the South Bend foundry.

CENTER: Another view of one of the Simpson Intensive Mix-Mullers which has helped Studebaker to double their foundry capacity.

BELOW: View showing five of the six No. 2 Simpsons in the Studebaker foundry, used for core sand preparation. Note motor operated, traveling weigh larries, which gather and weigh sand, clay and seacoal.



SIMPSON *Intensive* **MIX-MULLERS**

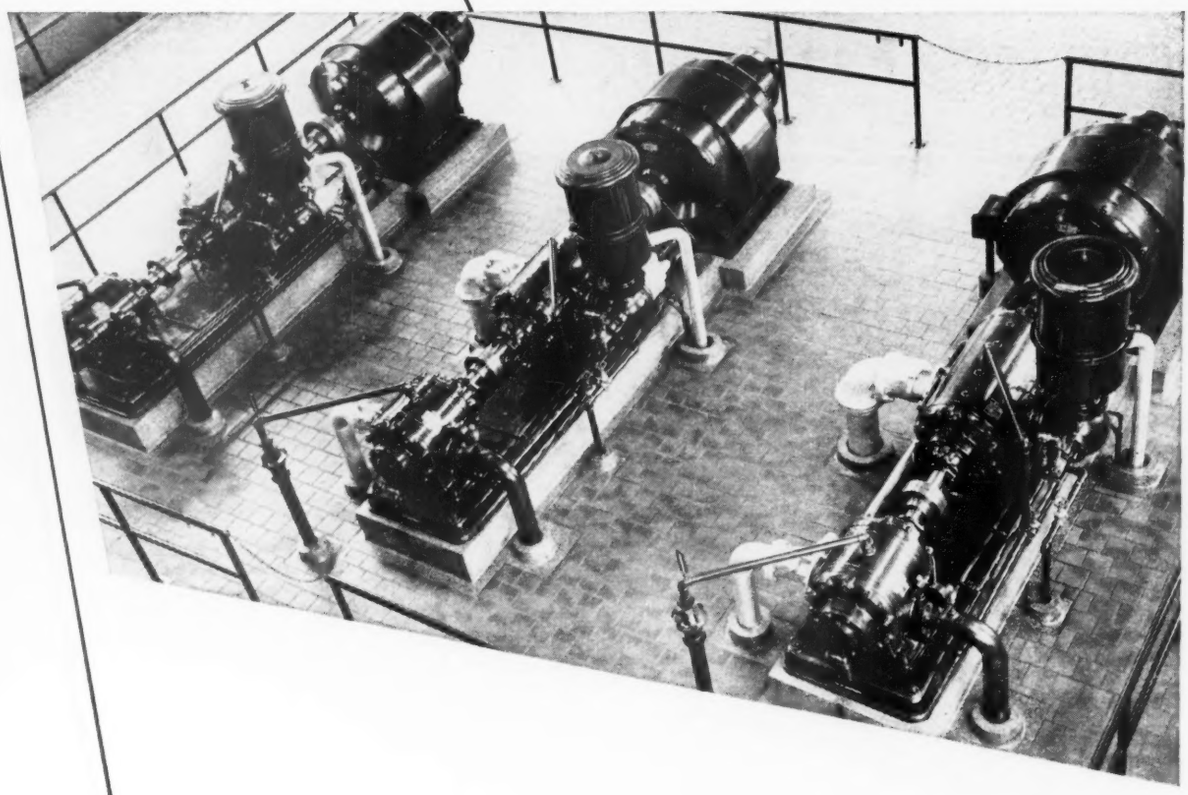
NATIONAL *Engineering Company*

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents: For Continental European Countries—George Fischer, Ltd., Schaffhausen, Switzerland; for British Possessions—August's Limited, Halifax, England; for Canada—Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico—CASCO S. De R.L., Mexico, D.F.

YOU ELIMINATE
HEAVY FOUNDATION COSTS
WHEN YOU INSTALL

Fuller Rotary Compressors



You eliminate heavy concrete foundations when you install Fuller Rotaries . . . even with the larger capacity machines . . . because with rotary there is no vibration. The battery of three Fullers shown above, having a capacity of 1085 c.f.m. each, at 100-lb. pressure, are mounted on comparatively light terrazzo foundations . . . and they're on an upper floor of the building. The installation is compact, streamlined, and efficient in operation.

Not only do you save in foundation costs, but Fullers have many other inherent advantages. They're simple in design, are easily operated, ruggedly built. And, they give you a *maintained capacity for the life of the machine.* They've *earned* their reputation for complete dependability.

Bulletin C-6 illustrates and describes these quality compressors . . . send for your copy today, and see how they will fit into your own plans and operations.

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St. • Chicago 3
420 Chancery Bldg. • San Francisco 4

C-228

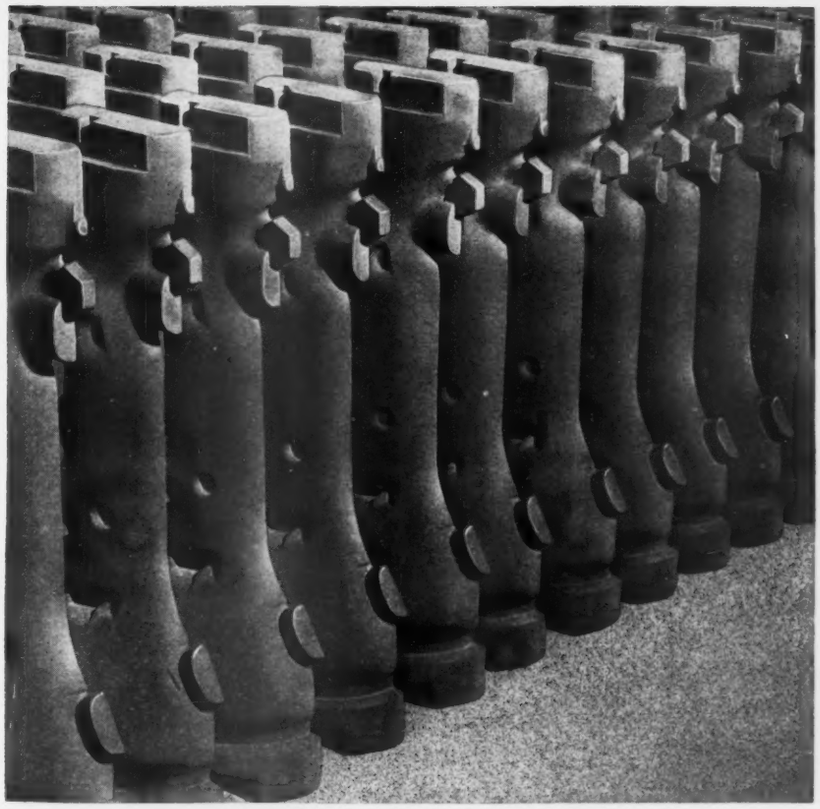
Fuller

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

Monsanto resins are

RESEARCH-BUILT...
JOB-TESTED...
SHOP PROVEN

for foundry use



Monsanto supplies both phenolic and urea resins for core binders. These large cores were bonded with RESINOX* phenolic resin.

For close to ten years, Monsanto has pioneered the development of special foundry resins for core binders and shell molding. From hundreds of formulations tested in a well-equipped foundry laboratory, several outstanding resins have been developed and refined for the special needs of foundry work. Among these are Monsanto's

RESINOX phenolic resins	in powder form	for shell molding
RESINOX phenolic resins	in liquid form	for core binders
RESIMENE* urea resins	in powder form	for core binders

Another exclusive Monsanto development is a dust suppressant for shell molding. While not an essential element of the shell molding technique, Dust Suppressant A has been found to contribute significant benefits to the many foundries now working with shell molding.

GET THE COMPLETE STORY ON SHELL MOLDING

Detailed, factual, complete . . . this new manual answers all your questions about shell molding. Fully illustrated with pictures and description of the process, materials and equipment needed, sand evaluation, and other practical discussions to answer your questions about this new method of casting metal. Monsanto will be glad to send you a copy without obligation. Just mail the handy coupon.

*Reg. U. S. Pat. Off.

MONSANTO CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Plastics Division, Room , Springfield 2, Mass.

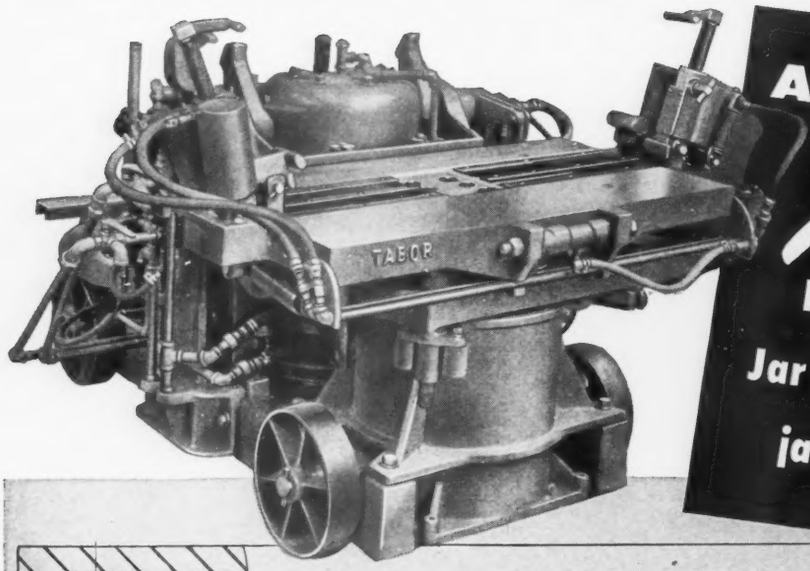
☐ Please send me your free new booklet on the shell molding process.
☐ Please send me data on Monsanto's foundry resins. (Please give details about the type of work you are considering.)

Name & Title _____

Company _____

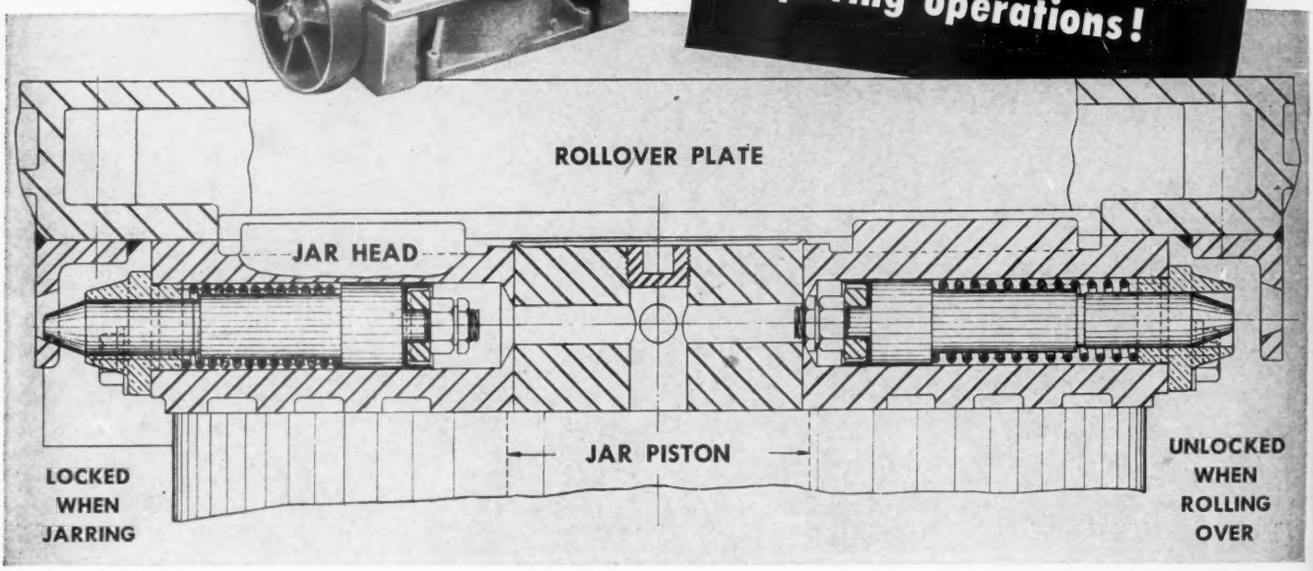
Address _____

City, Zone, State _____



ANOTHER TABOR FIRST...

Rollover Plate and Jar Head locked during jarring operations!



ROLLOVER PLATE—JAR HEAD LOCKING DESIGN

The above sectional drawing illustrates Tabor's new locking arrangement. Jarring air pressure automatically throws rugged pins into seats under the rollover plate. Pins retract under spring tension when jarring valve is closed.

HERE'S a feature never before offered in jar, power rollover, power draw machines. New Tabor construction locks rollover plate and jarring mechanism *into one rigid assembly* the moment jarring air is introduced.

This gives you *four* distinct advantages:

(1) Effectiveness of jarring blow is increased 25%.

(2) Ramming effect is equalized *all over the mold.*

(3) Does away with unwanted "secondary jolt" between plate and jar head—adds greatly to life of both members.

(4) Eliminates all plate wobble, even when handling a mold with uneven weight distribution.

Always big producers, Tabor Rollovers also feature the new quick-change-over table which permits *independent* setting of all four clamps—a table design which is invaluable in either core room or jobbing shop where pattern changes are frequent.

Get full details. Write, wire, or phone today.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

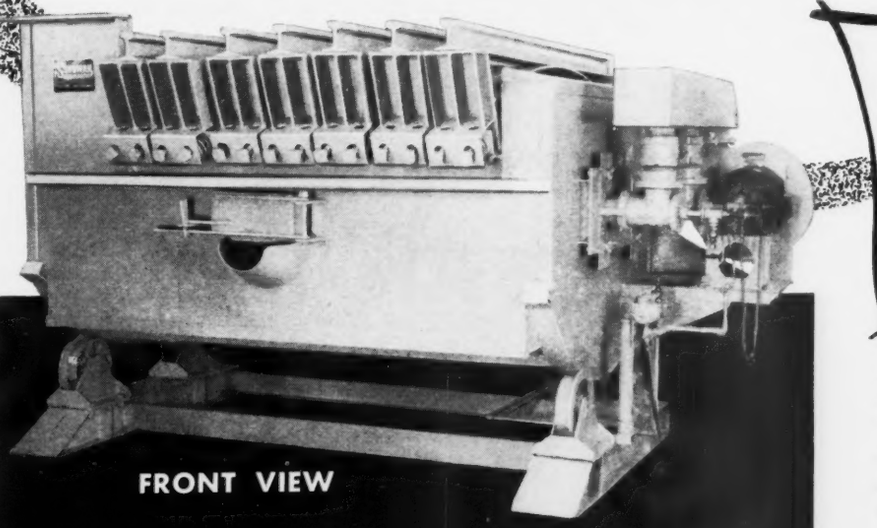
The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6223 TACONY STREET • PHILADELPHIA 35, PENNA.

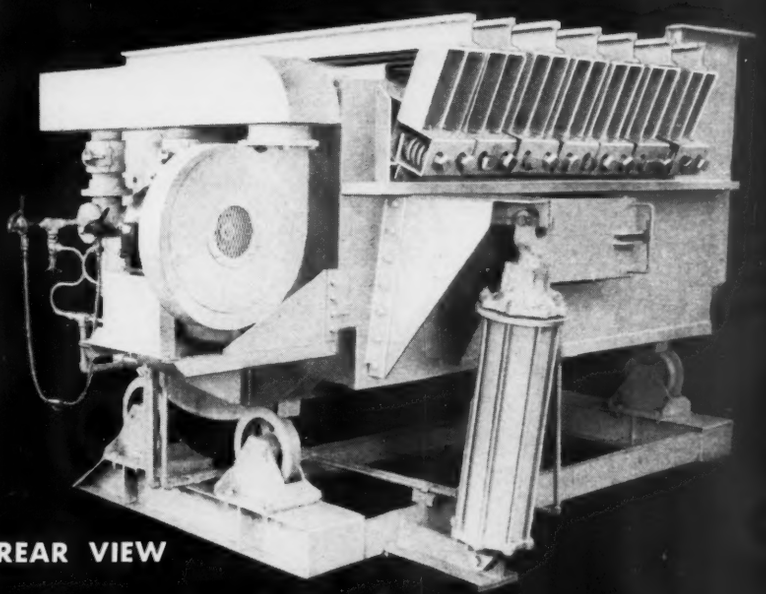
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Another NEW STROMAN
REVERBERATORY FURNACE FOR COPPER ALLOYS or IRON!

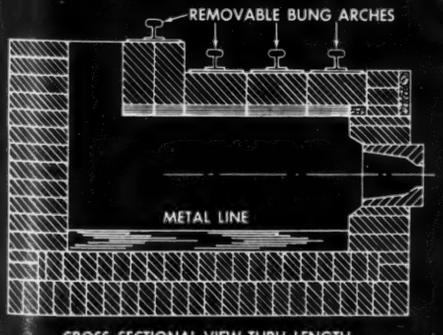
The Most Economical Furnace Ever Made to Handle Capacities from 400 to 10,000 pounds per heat.



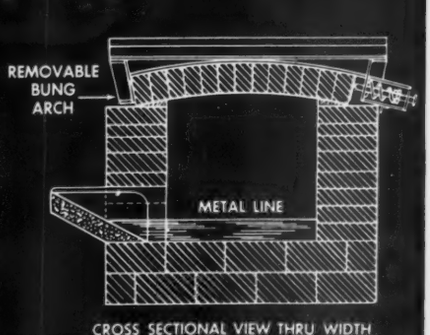
FRONT VIEW



REAR VIEW



CROSS SECTIONAL VIEW THRU LENGTH



CROSS SECTIONAL VIEW THRU WIDTH

Stroman "JC" Reverberatory Furnaces are built on the same basic ideas as the "air furnace" except that it is smaller and tilts instead of taps to pour . . . MELTING TIMES are the lowest known, ranging from 15 minutes to 2½ hours according to size of furnace and charge. It is excellent for COPPER BASE ALLOYS of low zinc content (containing not over 7% zinc). For such alloys, no more economical method has ever been devised for handling, melting, maintenance, charging, pouring and fuel consumption . . . and you can switch from one alloy to another without contamination. Castings produced from the "JC" are of excellent grain structure and free from porosity. Metal loss is lowest of any other type furnace. IRON MELTING . . . These furnaces will bring cold charges of iron up to casting temperatures of 2800° F., or they may also be used as a holding furnace of metal from a cupola. The "JC" is also highly recommended for special heats as well as production work. It has a decided advantage over a cupola in that it can be used for 6 to 8 successive heats a day. Cupolas cast just once a day. This enables a foundry to operate in slow times as a full crew is not necessary for ample production. These furnaces are gas, oil or combination gas-oil fire. They are automatically tilted and handle their metal perfectly. For greatest speed of melting and utmost economy investigate the Stroman "JC" Reverberatory . . . it will open the door to greater profits for you.

Write for full information and specifications today.

Printed in U.S.A.

STROMAN FURNACE & ENGINEERING CO.

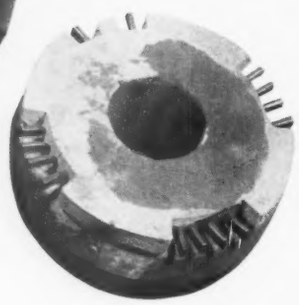
DIVISION OF

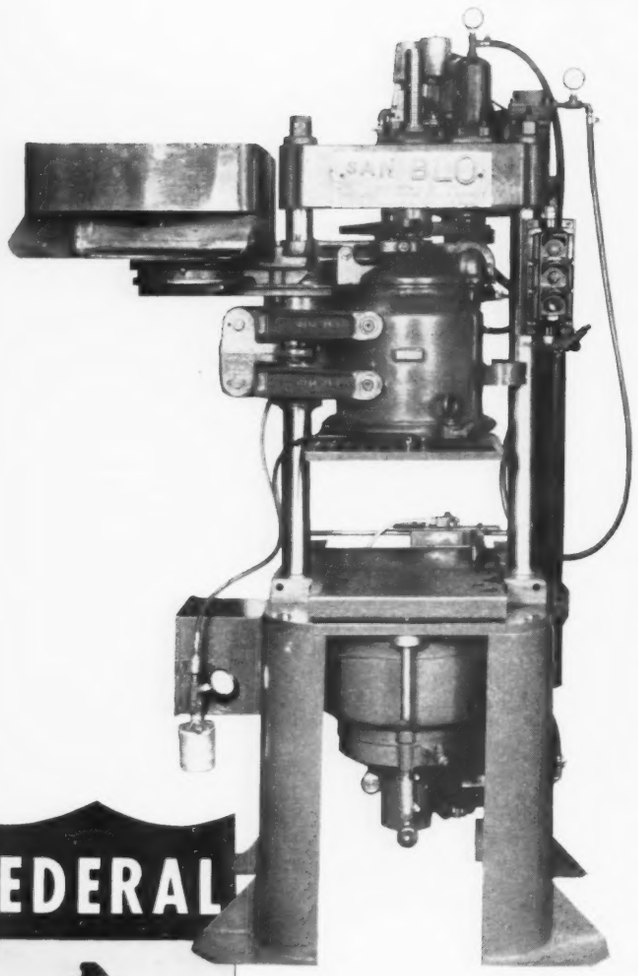
THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

Now YOU CAN BLOW

with the amazing new PULSATOR MODEL SAN-BLO

designed for blowing open core boxes **(wood and metal)** *without special rigging*





The Pulsator SAN-BLO is the most amazing development ever introduced for core rooms—as revolutionary as the first core blower itself. It offers an entirely new core blowing technique by which wooden core boxes can be blown as successfully as metal boxes.

This means that every foundry in the country can now take advantage of the economies of machine core blowing.

The first SAN-BLO core blower introduced the mechanized sand magazine (motor-driven plows and aerating air circuit to *move* sand to the blow hole and *carry* it into the core box) which made it possible to blow *any* core sand mixture that could be hand-rammed, and to blow cores weighing from ounces to 40 lbs. each, without changing sand magazine.

Now, with the Pulsator feature, foundries using a preponderance of open, wooden core boxes can blow cores, too. For the Pulsator does away with high air pressure in the core box, which up until now has prevented the blowing of wooden boxes. An ingenious arrangement of air valves and electronic switches makes it possible to closely control the air pressure within the core box, keeping it extremely low during the blowing cycle. The core box is filled with two, three or four short, quick blows, instead of one long blow. This holds pressure within the box close to atmospheric pressure, so that any wooden core box, assembled with nails or screws, may be blown safely and accurately. The start and stop blowing action is fast—cores are blown in a very few seconds time.

The Pulsator feature makes the SAN-BLO truly an *all-purpose* core blower. With it you can blow *all* your open core boxes—wood and metal, in their present condition, as well as closed boxes. No special rigging, no reinforcements, and in most cases, no vents, wires or rods. You can blow any core sand mixture you can hand-ram. You can blow cores weighing up to 40 lbs. each, without changing sand magazines.

All Pulsator models are convertible—turning a safety switch quickly changes operation from Pulsating to conventional core blowing for metal boxes. The standard "40" model Pulsator produces cores weighing up to 40 lbs. each. Models also available for cores up to 150 lbs. and 250 lbs. each. For information on the new Pulsator SAN-BLO, contact your local Federal representative or write us for literature, specifying your maximum core weight and dimensions.

FEDERAL

THE FEDERAL FOUNDRY SUPPLY COMPANY

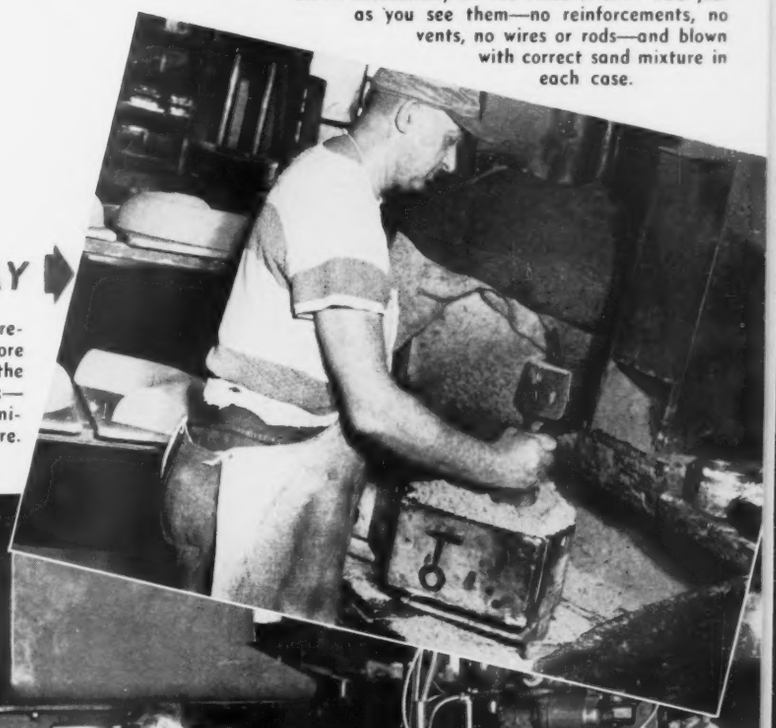
4600 EAST 71st STREET • CLEVELAND 5, OHIO

WOODEN CORE BOXES!*

* The core boxes shown here with their respective cores (and hundreds of similar wooden boxes) have been blown successfully on the Pulsator SAN-BLO just as you see them—no reinforcements, no vents, no wires or rods—and blown with correct sand mixture in each case.

THE OLD WAY

Hand-ramming a core requires from 5 to 20 or more minutes, depending on the complexity of the core box—and the core is seldom as uniform as a machine-blown core.



THE NEW WAY . . .

Here's a Pulsator SAN-BLO in operation at the Atlantic Foundry Co. of Akron, Ohio. Wooden core boxes, formerly hand-rammed, are now being blown in but a few seconds time. This is a dual control machine—one man drawing while the other is blowing a core. Boxes delivered to the machine are arranged so that when one operator is working on a hard-to-draw box, the other operator blows and draws two or three ordinary boxes. The machine never stands idle while cores are being drawn.

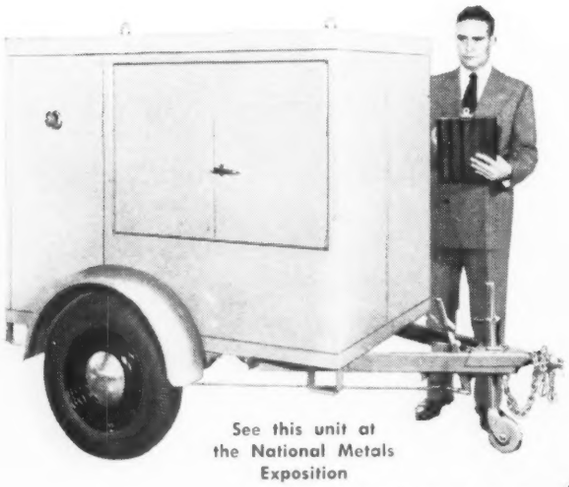
YORK RICHMOND, VA. CROWN HILL, W. VA. CHATTANOOGA

OIT CHICAGO MILWAUKEE UPTON, WYO. LOS ANGELES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

NOW — a *truly* portable industrial x-ray unit!
The General Electric RESOTRON 250

Compact, lightweight, 250,000-volt x-ray unit speeds inspection of large structures, saves many hours of set-up time



See this unit at the National Metals Exposition

For radiographic examination of welds or castings in large structures, the new GE Resotron 250 offers unprecedented advantages. Completely housed in a cabinet only 4 x 6 x 4-foot high, which may be trailer-mounted, this unit can be set up anywhere in a few minutes by one or two men.

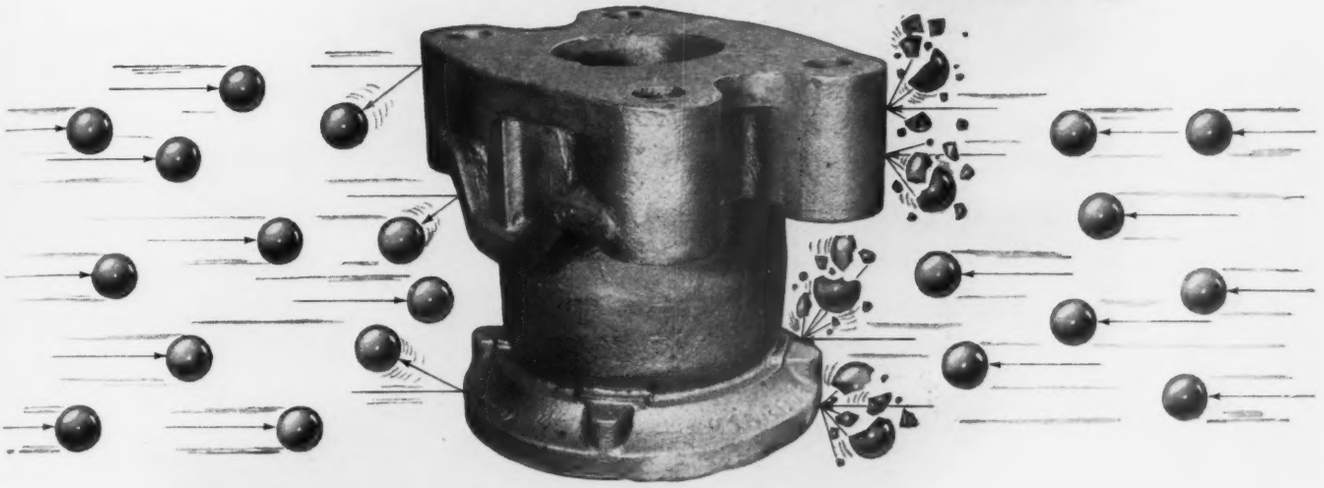
Small, lightweight tube head can be passed through a 15-inch diameter opening for interior inspection of large vessels. It's particularly adapted for ship hulls, pressure vessels, steam pipes. No cranes or elaborate rigging needed — can be manipulated manually.

Resotron 250 is the latest addition to the complete GE line of industrial x-ray apparatus . . . ranging up to 2,000,000-volt units and betatrons. It is actually a miniature of the famous General Electric million-volt Resotrons, with such time-proven features as resonant transformer, cascade tube and gas insulation.

Have you inspection problems the Resotron 250 might solve? See your local GE x-ray representative. Or write X-Ray Department, General Electric Company, Milwaukee 1, Wis., Rm YY-10.

GENERAL ELECTRIC

Shattered Shot Shatters Savings



TRU-STEEL NEVER SHATTERS

When abrasive shatters, as most abrasives do, your blast cleaning costs are bound to be greater. The number of passes before shattering determines the efficiency of an abrasive and accounts for the savings made by steel abrasives over ordinary chilled iron. Tru-Steel Shot NEVER SHATTERS. It maintains its size and shape longer, giving many more hours of efficient blast cleaning.

TRU-STEEL HAS THE ENDURANCE OF STEEL

Tru-Steel Shot lasts many times longer than other abrasives because it is made of tough, high-carbon steel. As a result, one pound of Tru-Steel cleans as much work as 3 to 6 pounds of iron abrasives that shatter.

TRU-STEEL HAS A FULL HEAT TREATMENT

To make Tru-Steel even tougher, it is fully heat-treated, not just drawn or annealed. This is another reason why it never shatters, why you have less abrasive to buy when you use Tru-Steel.

TRU-STEEL COSTS LESS TO USE

Other premium abrasives claim savings too, but comparative tests prove Tru-Steel's superiority. For example, the results of a typical test made by a prominent manufacturer show the following cost per hour:

Abrasive "A"	**$ .67**	**Abrasive "B"**	**$.978**
Abrasive "C"	**$1.33**	**Tru-Steel**	**.467**

Until you've tried Tru-Steel, you can't be sure the abrasive you are using is giving you maximum life at the lowest cost.

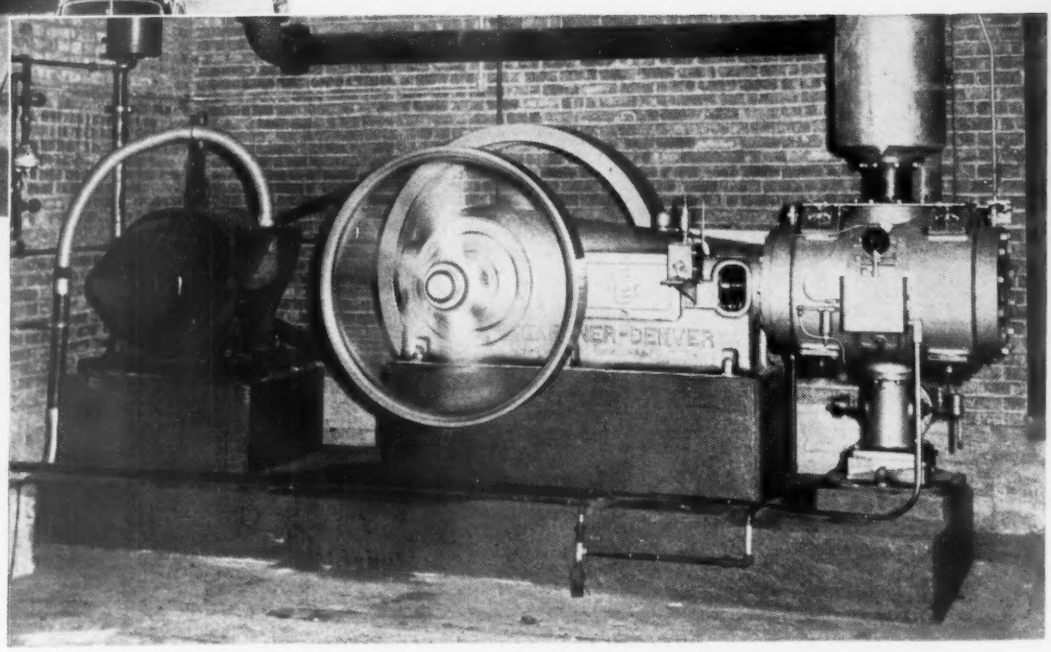
Mfg. by Steel Shot Producers, Inc., Butler, Pa.

Bulletin 59-A shows where the average cleaning dollar is spent and how savings can be made. Send for your copy today.

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka Ind.

TRU-STEEL SHOT

Unrestricted Flow



Gardner-Denver RX Single-Stage Compressors are made in a wide range of sizes to assure the right pressure and capacity for your needs.

. . . another reason why GARDNER-DENVER RX compressors save you money!

Free and easy! That's the way air flows through the large, unrestricted valve and port areas in the Gardner-Denver RX Compressor. That means the RX uses less power to supply the compressed air you need—and there you have one of the big reasons why an RX costs less to operate.

Other money-saving RX features include the dust-tight, heavy-duty power end—automatic lubrication—and "Air-Cushioned" Duo-Plate valves. Write today for additional information.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Two of five!

Detroit ROCKING Electric Furnaces build long service record—melting bronze for the Jeffrey Company foundry

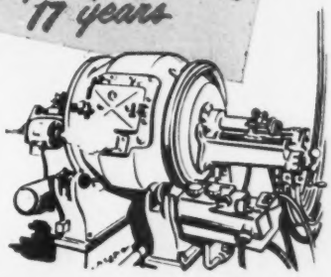
At The Jeffrey Manufacturing Company, Columbus, five Detroit Electric Furnaces have made excellent records melting bronze for worm wheels, bearings, bushings, electrical contacts, and pressure-type castings. In hundreds of other foundries, Detroit Furnaces are doing equally outstanding jobs melting bronze, iron, and steel alloys.

Detroit Rocking Electric Furnaces turn out fast melts of uniform high quality metal. Close control of analysis produces metal of desired analysis time after time, with optimum use of power. The melts are homogeneous, thoroughly mixed by the rocking action of the furnace. Electrodes are free of the molten metal at all times, reducing carbon pick-up to an absolute minimum.

Long life of Detroit Electric Furnaces is documented by such installations as that shown. Economies are proven, too—accomplished by full use of power, less heat loss, reduced metal shrinkage, more heats per day, less metal waste per melt, and reduced out-of-production time because of longer refractory wear and easy shell replacement.

Detroit Rocking Electric Furnaces are tailored to your operating needs. Capacities from 10 to 4000 pounds, for ferrous and non-ferrous melting.

1 350 lb. furnace installed 1925
1 350 lb. furnace installed 1925
1 350 lb. furnace installed 1937
1 700 lb. furnace installed 1941
1 700 lb. furnace installed 1942
average age 17 years



Better melts, faster melts—rocking action does it! Get the facts on what Detroit Rocking Electric Furnaces can do for you! Send us your data now!

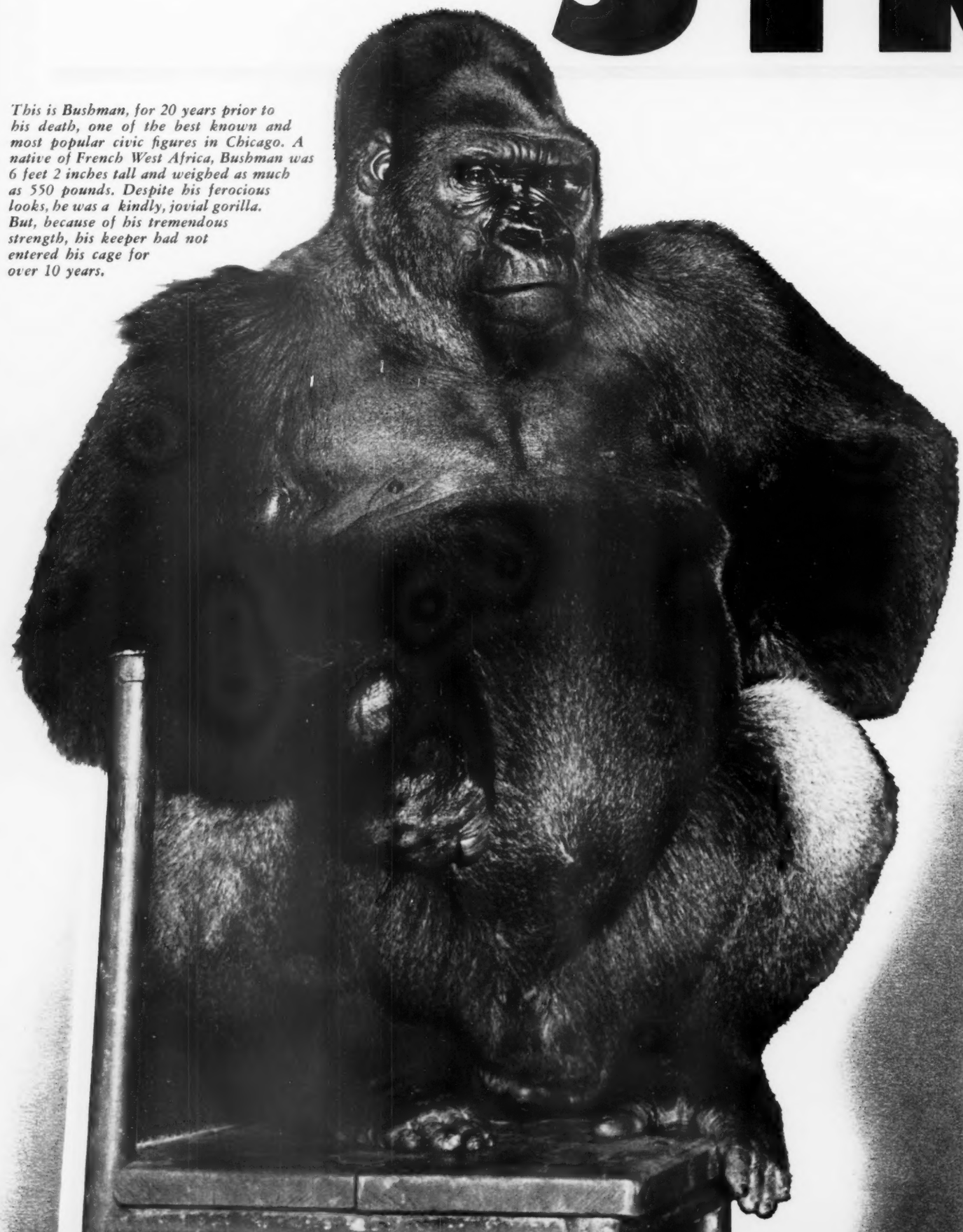
DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

FEMA

STR



This is Bushman, for 20 years prior to his death, one of the best known and most popular civic figures in Chicago. A native of French West Africa, Bushman was 6 feet 2 inches tall and weighed as much as 550 pounds. Despite his ferocious looks, he was a kindly, jovial gorilla. But, because of his tremendous strength, his keeper had not entered his cage for over 10 years.

RENGTH

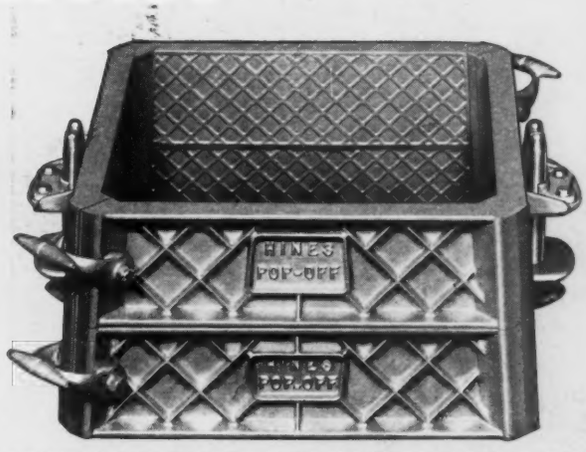
Certainly among the mightiest of all animals is the male gorilla, native of the forest regions of West Africa. Broad, powerful shoulders and long, muscular arms give him an enormous strength that is highly respected throughout the jungle.

HINES FLASKS, too, are noted for their strength. Fixture-built to extreme accuracy, reinforced at the parting line and buttressed with diagonal ribs—they're built to outperform and outlast any other flask on the market. They give better, longer service simply because they're made better and stronger than other flasks. HINES "Pop-Off" Flasks last longer, too, because hammering isn't necessary for removal—just move the levers and off they come.

Yes, if it's strength you need in flasks, you can depend on HINES FLASKS to provide it.

HINES

HINES POP-OFF FLASK

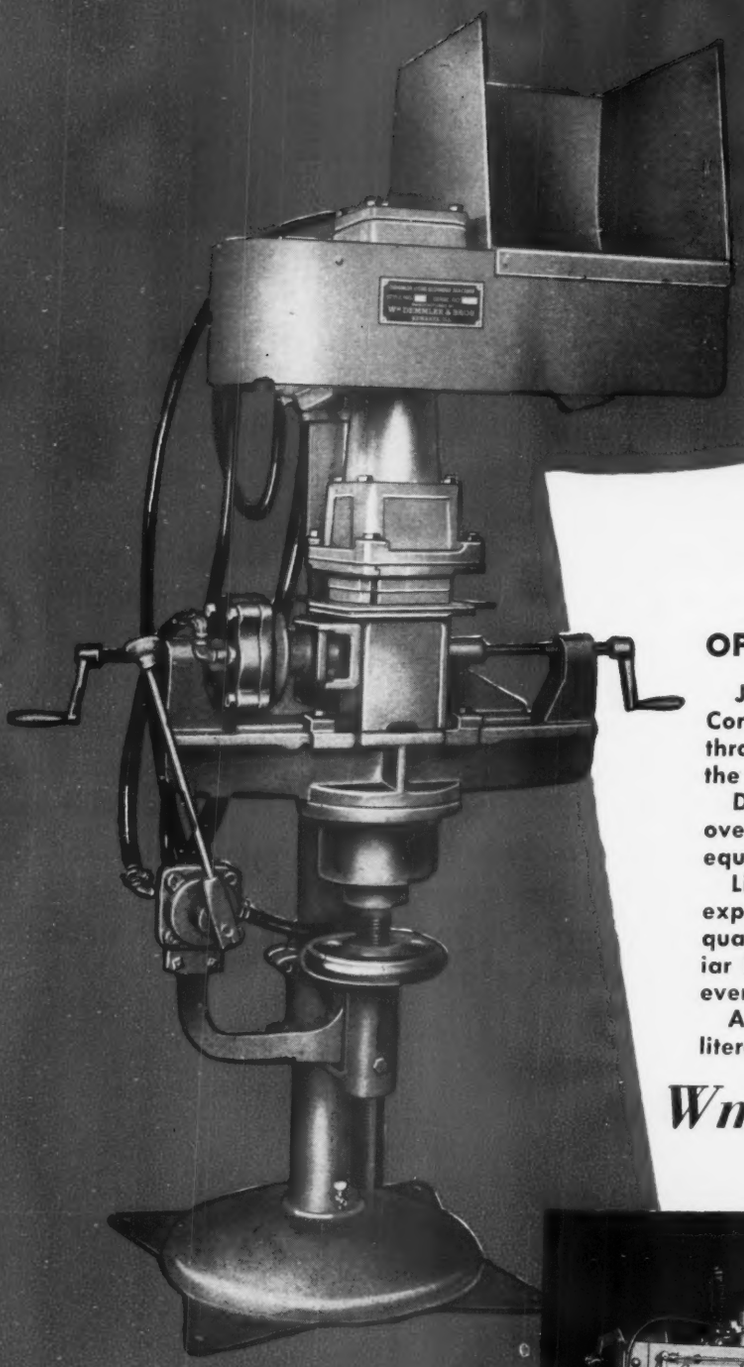


THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO • TELEPHONE: ORCHARD 1-2806

District Photo

Profits Multiply...



DEMMLER
NO. 55

MANUFACTURERS OF CORE BLOWERS
EXCLUSIVELY SINCE 1911

DEMMLER
CORE BLOWERS

OFTEN COPIED — NEVER EQUALLED

Join the thousands who depend upon DEMMLER Core Blowers to assure them greater profits through an efficiency that sets the standards for the industry.

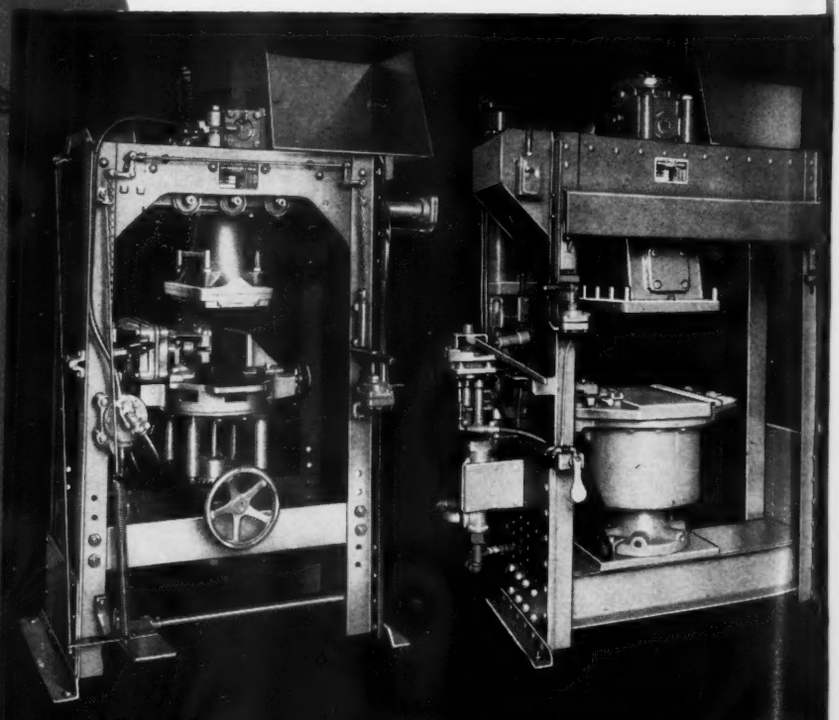
DEMMLER Core Blowers have led the field for over 40 years. They are often copied—never equalled!

Little wonder that Foundrymen have come to expect outstanding performance and matchless quality from every core blower bearing the familiar DEMMLER name. There's a machine to meet every core blowing requirement.

A letter stating your needs will bring descriptive literature promptly. Write today!

Wm.* DEMMLER *& Bros.

Kewanee, Illinois



DEMMLER NO. 1 DEMMLER NO. 3E

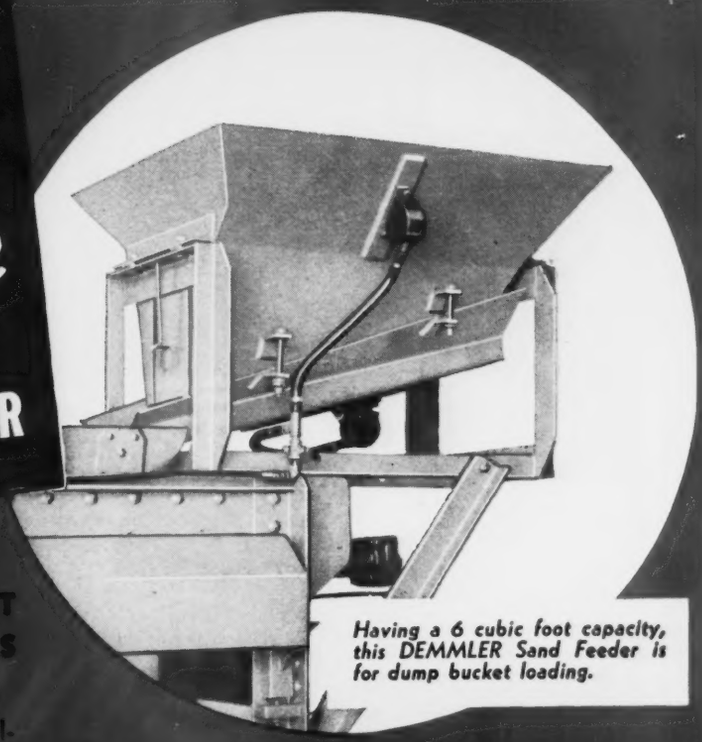
ELIMINATE "POKING OF SAND"

Increase Core Blower Production With NEW

DEMMLER

NON-CLOGGING

VIBRATORY SAND FEEDER



Having a 6 cubic foot capacity, this DEMMLER Sand Feeder is for dump bucket loading.

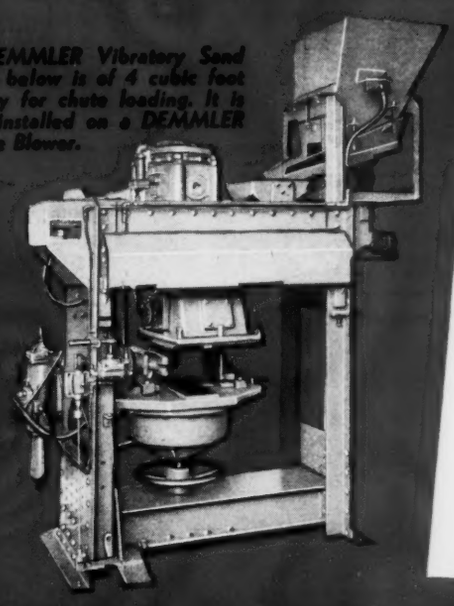
FOR CHUTE OR DUMP BUCKET LOADING OF CORE BLOWERS

Here's another dependable DEMMLER development that means increased core production at lower cost!

It's the new DEMMLER Non-clogging Vibratory Sand Feeder that makes it unnecessary for machine operators to take "time out" to load sand.

Under development and exhaustive tests for 2 years, the DEMMLER Vibratory Sand Feeder is powered by two comparatively noiseless rotary type vibrators in which an air stream forces a 1-3/8" steel ball around a hardened steel track.

The DEMMLER Vibratory Sand Feeder below is of 4 cubic foot capacity for chute loading. It is shown installed on a DEMMLER 3K Core Blower.



SAND FLOWS "LIKE WATER"

Sand is stored in the hopper above a sloping chute. When the core machine carriage is in filling position, the feeder starts automatically, walking the sand down the chute into the sand magazine. Because of its vibrating action, sand is delivered into the core blower in an ideal condition for blowing. No poking by operator is ever required because sand flows like running water — even when it is so stiff you can pack it into "snow-balls"! Sand flow stops automatically when core machine carriage is in blowing position.

Sand feeder cannot overfeed. When hopper is full, sand delivery stops.

EASY TO MAINTAIN — WILL LAST INDEFINITELY

The DEMMLER Vibratory Sand Feeder requires absolutely no attention once set into operation with cycle of machine. Maintenance of sand feeder is negligible since there are extremely few moving parts. This means long, long life!

Available for any DEMMLER Core Blower, from the small No. 55 to the large No. 4E, the non-clogging sand feeder is shipped complete with all valves and equipment necessary for mounting. It is available in 4 cu. ft. capacity for chute loading and in 6 cu. ft. capacity for dump bucket loading.

Should a larger sand storage capacity be required, the customer can easily extend the sides of the storage hopper furnished on the feeder.

Write — today — for complete details!

Wm. DEMMLER & BROS.

KEWANEE, ILLINOIS

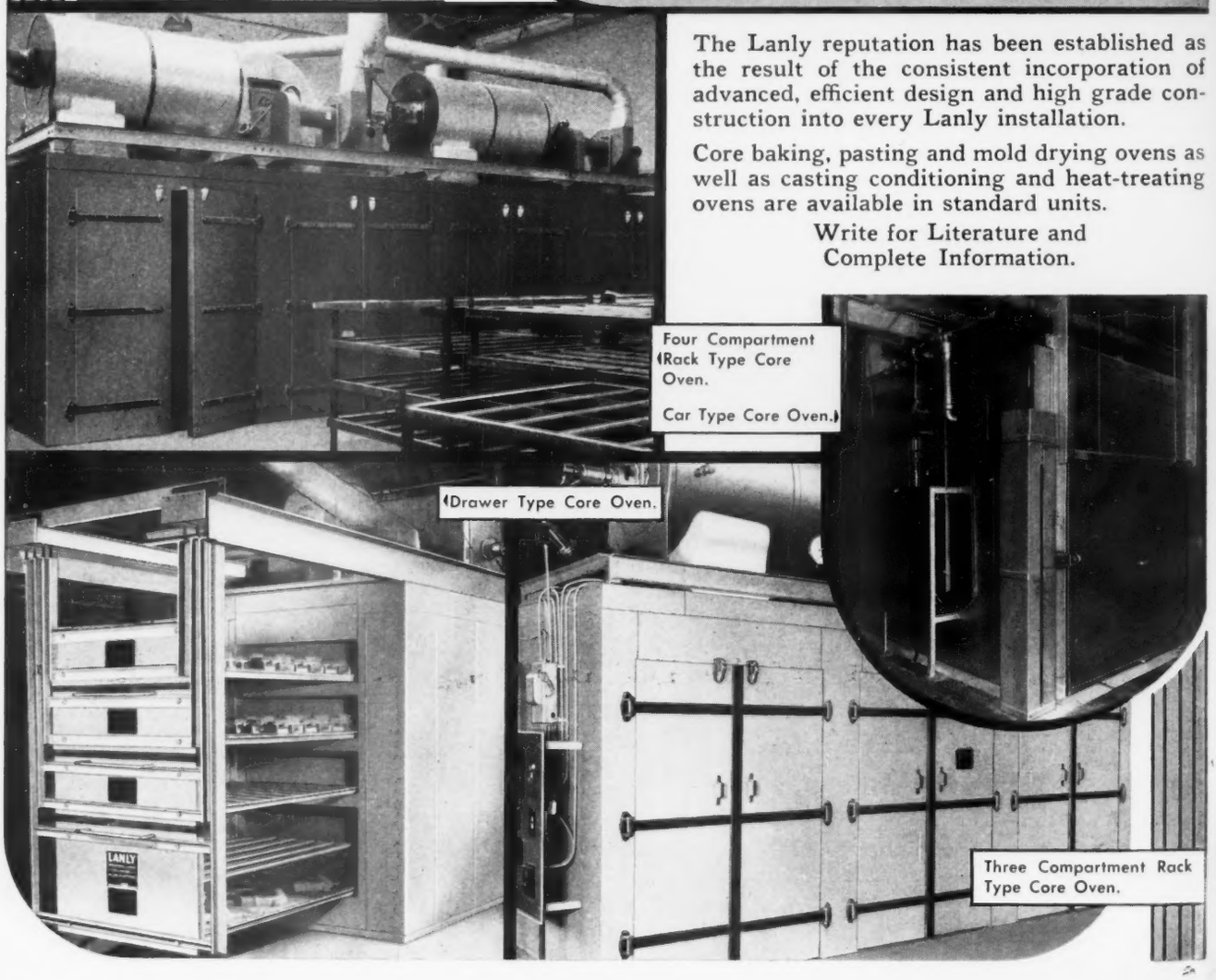
Speed plus dependability ★ *Manufacturers of Core Blowers Exclusively Since 1911*

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.

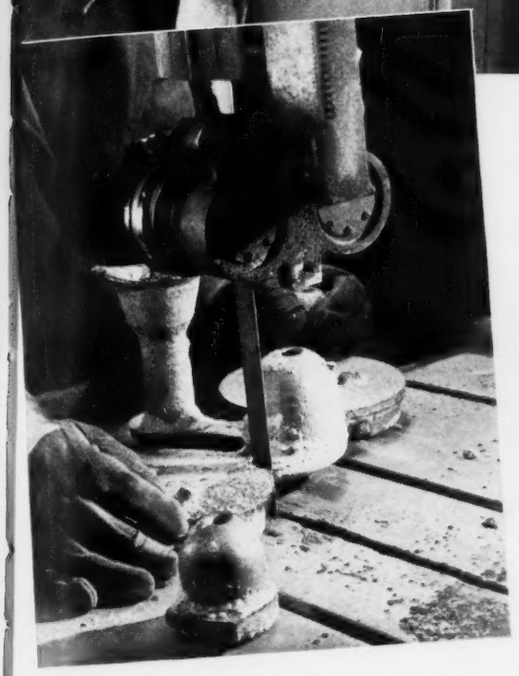

Four Compartment Rack Type Core Oven.
Car Type Core Oven.
Drawer Type Core Oven.
LANLY
Three Compartment Rack Type Core Oven.

SPEED UP GATE REMOVAL with DoALL FRICTION SAWING!

THE speed of DoALL Zephyr Band Machines for removing gates, risers, flash and other superfluous material from castings will surprise you. DoALL Zephyr Band Machines are fast: they have actually saved as much as 90% in time and tool costs, depending on the thickness of the work. With DoALL you are able to get into complicated spaces and cut *close* to the casting and as finish is generally of high quality, grinding can be either eliminated or materially reduced. The cut is made fast enough so as not to allow heat penetration into the side wall of the finished cut and skin hardness never exceeds .003" deep. Zephyr Friction Sawing means low tool cost and greater tool safety for the operator.

Where extremely fine tolerance and optimum efficiency is desired, automatic hydraulic feeding tables are available. There is a size DoALL Zephyr for every pocketbook and for almost every problem. If you have a special problem we will cooperate with you in tailoring saw design to solve it. Here are advantages you should look into. Ask for a free demonstration in your own plant. Call our local DoALL Sales Service Store or write.

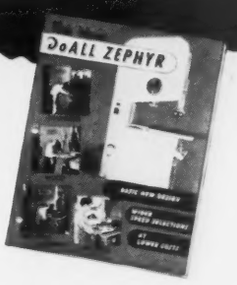
THE DoALL COMPANY, 254 N. Laurel Ave., Des Plaines, Ill.



Above: **Here is a DoALL Zephyr in a typical installation removing dead metal.**

Below: **With DoALL Friction Sawing you can cut close to the live metal and reach the hard-to-get-at places.**

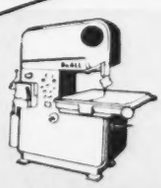
SEND FOR CATALOG

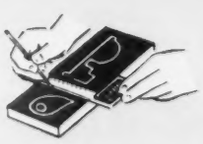


There is quite a story on costs and speeds in handling castings of various thicknesses. Ask for complete details with a catalog on DoALL Modern Band Machines.

BMF-1

DoALL





Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

USCO

35000 LBS. TENSILE STRENGTH ...WITHOUT HEAT TREATMENT!

USCO T is the high-tensile aluminum alloy that gives you physical properties usually obtainable only by heat treating —without this delay and costly extra step.

USCO T can be cast in both sand and permanent mold. Typical properties in sand after two weeks natural aging are 35000 T. S., 25000 Y. S., 5% elongation and 74 Brinell. The elimination of heat treating minimizes warpage problems.

USCO T is available now for prompt shipment. For further information on this exceptional time and money saving aluminum alloy contact your USCO representative now or write us direct.

FREE —Send for your USCO Aluminum Alloy Selector. A handy guide to analysis, specifications and many other foundry problems.

For 48 years, pioneers in aluminum development.

USCO **U. S. REDUCTION CO.**
East Chicago, Indiana

PLANTS: EAST CHICAGO, INDIANA • TOLEDO, OHIO

to go to **BUFFALO** *for our* **PATTERNS"**

Paradoxical as the statement above may seem, smart foundry men everywhere have discovered that it really pays off in "time saved" to come to Buffalo for *better* Patterns. When a Buffalo Pattern is delivered, it will fit your particular set-up and production schedule like a glove. There's *never* any adapting or extra rigging to do on a Buffalo Pattern. And...once you're in production, you'll find that your scrap ratio is so tiny that never again will you use any other kind of Pattern on your important jobs.

Here at Buffalo, you'll find the *new* type of Engineering that plans *every* detail of *every* job and the *old* type of Fine Craftsmanship that takes pride in producing every job *precisely*. If you would like to save money, save time and headaches, we cordially invite you to discover *for yourself* the tremendous difference in a *better* Buffalo Pattern.

BE OUR GUEST

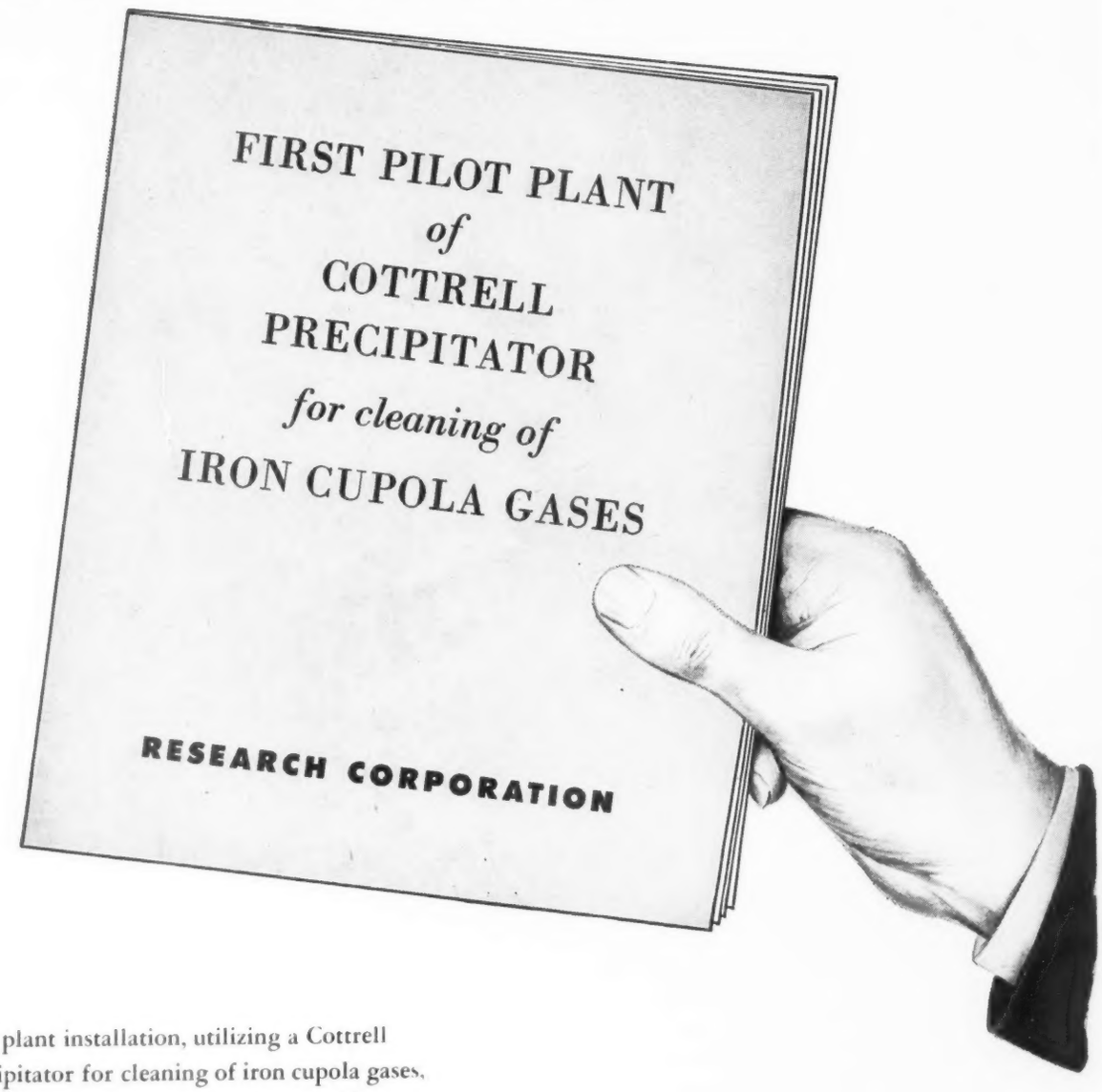
Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.

Production and Experimental Pattern Equipment • Shell Mold Pattern Equipment • Permanent Molds
Pattern Engineering Drawings • Forging Dies • Non-Ferrous Castings • Shell Mold Castings • Metallizing

BUFFALO PATTERN WORKS, INC. • **832 HERTEL AVE., BUFFALO 16, N. Y.**

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

News on a New Process



The first pilot plant installation, utilizing a Cottrell Electrical Precipitator for cleaning of iron cupola gases, had resulted in detailed findings of industry-wide importance. On the basis of facts unearthed about cupola operation and the study of the design factors involved in this project, foundries have already placed orders for 15 precipitators with Research Corporation.

Ask your Research Corporation representative to go over the findings of this first pilot plant installation with you. His recommendation on your specific problem is based on 39 years of experience in the design and erection of over a thousand Cottrell Electrical Precipitators.

RESEARCH CORPORATION

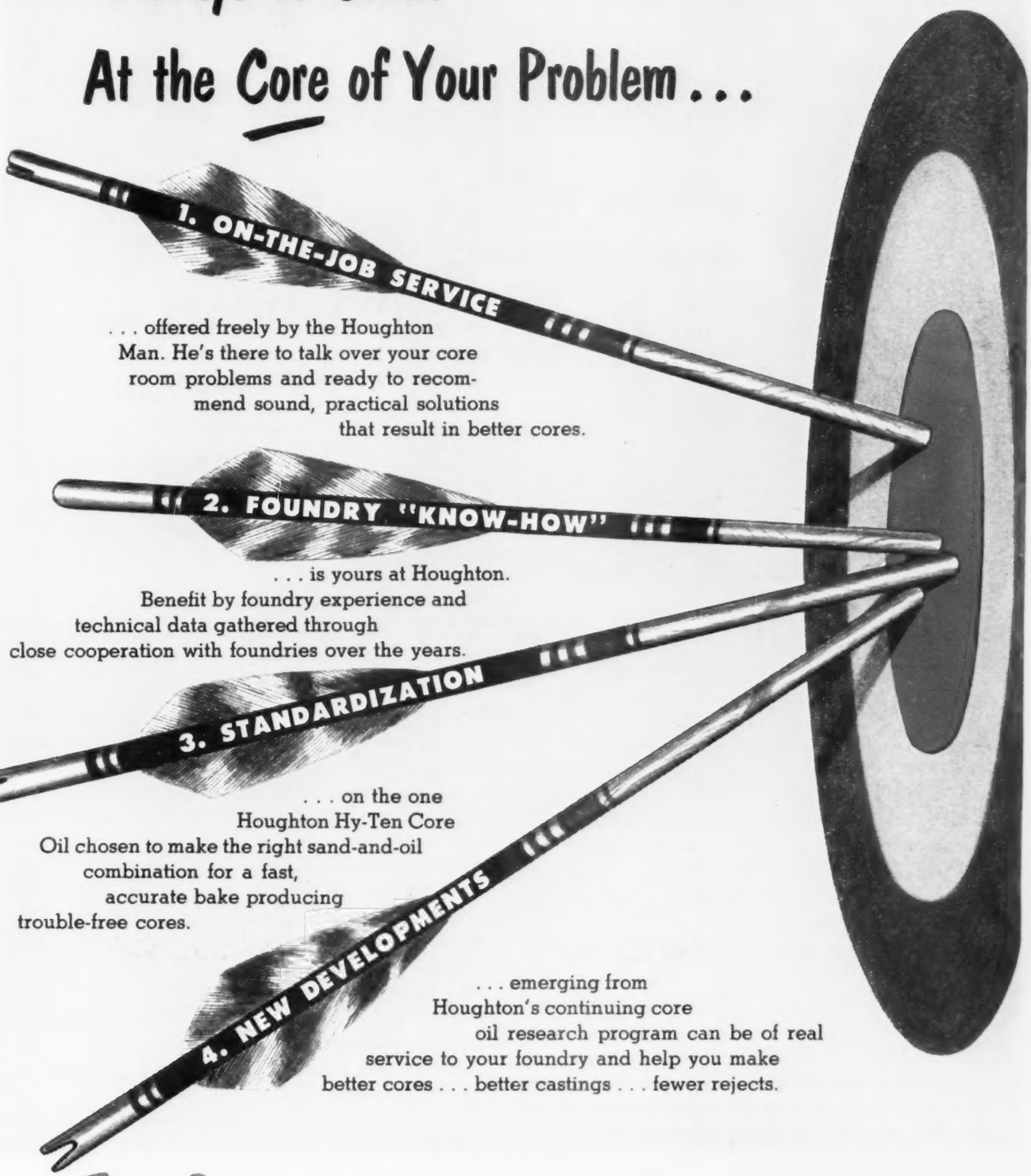
405 Lexington Avenue
New York, New York

122 South Michigan Avenue
Chicago 3, Illinois

Bound Brook, New Jersey

RC-133

4 Ways to Strike At the Core of Your Problem...



. . . offered freely by the Houghton Man. He's there to talk over your core room problems and ready to recommend sound, practical solutions that result in better cores.

. . . is yours at Houghton. Benefit by foundry experience and technical data gathered through close cooperation with foundries over the years.

. . . on the one Houghton Hy-Ten Core Oil chosen to make the right sand-and-oil combination for a fast, accurate bake producing trouble-free cores.

. . . emerging from Houghton's continuing core oil research program can be of real service to your foundry and help you make better cores . . . better castings . . . fewer rejects.

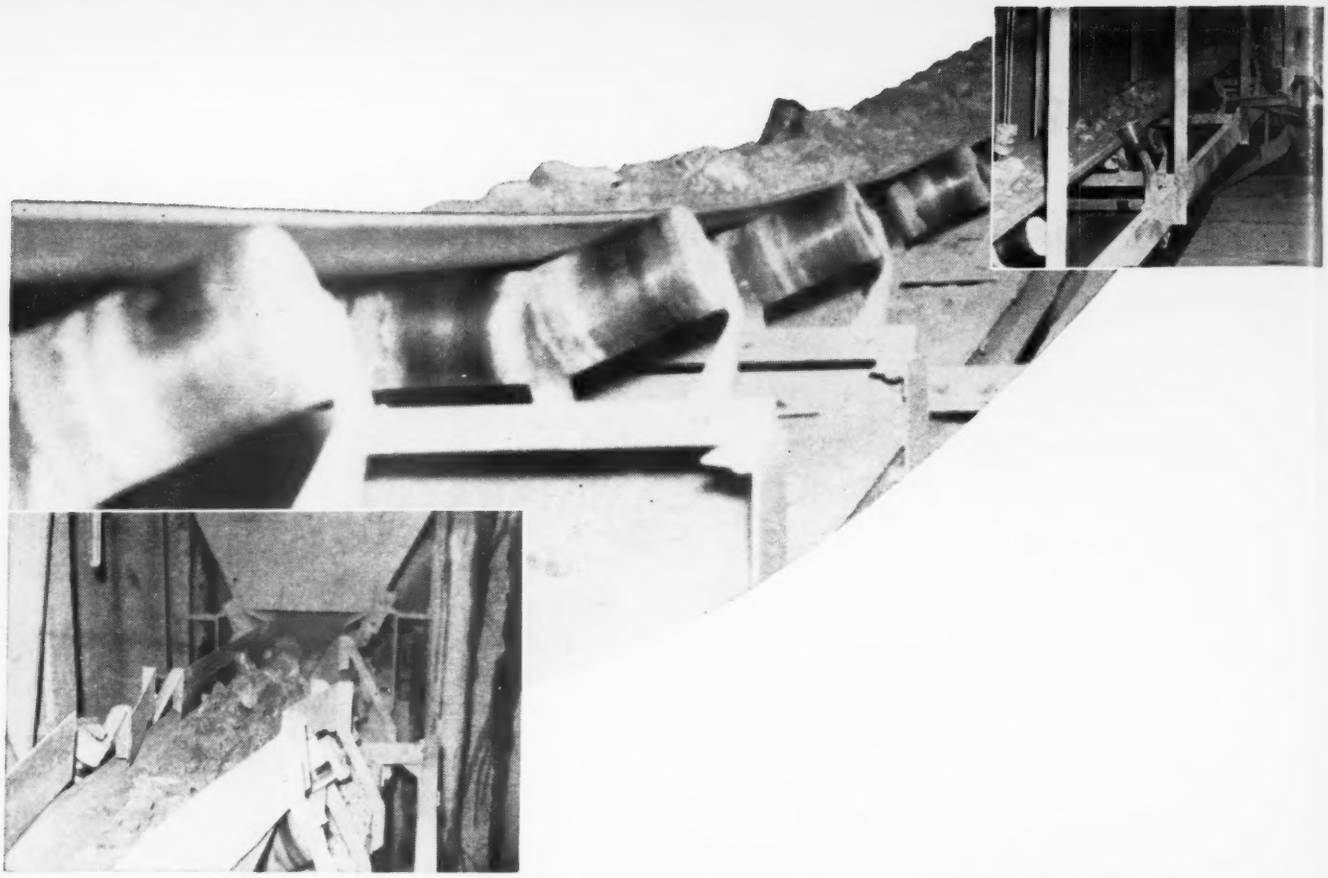
Hy-Ten Core Oils

. . . products of

E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Write to E. F. Houghton & Co., Philadelphia 33, Pa., for latest Hy-Ten Bulletin



REPUBLIC CONVEYOR BELT SAVES HANLEY COMPANY

93% belt replacement cost.

● Hanley Company operates a modern tile and brick-making plant in Summerville, Pa. Basic ingredient of their product is hard, abrasive fire clay. The clay is dumped into a primary crusher at the tipple, and then moved on Republic Conveyor Belting to a scalping screen, where the fines are separated from coarser lumps and dropped into storage bins preparatory to pugging, extrusion and baking.

A single 504-ft. length of 20-inch wide Republic Super Excelo Conveyor Belt handled the entire job (carrying more than 1,625,000 tons of material without mishap) for a 10-year period. Then, in July of 1948, the company installed some new production equipment and the old conveyor system became 18 feet too short. It seemed like an ideal time for belt replacement, but —

"Nothing doing!" said Charles E. Bates, Vice-president in Charge of Production. "The original belt had a perfect performance record and was in excellent condition. Ten years' service out of a Republic Belt didn't seem unusual. I simply ordered an extra 36-foot section of the same type Super Excelo Belting and had it spliced in position. That was four years ago. I saved 93% of the total replacement cost and the belt's still rolling along as good as ever!"

Yes, Mr. Bates, we expect it is. Many Republic Rubber Conveyor Belts and other Industrial Rubber Products have been in use for a quarter of a century and more. But we appreciate such loyalty and enthusiasm. As the leading specialized producer of Industrial Rubber Products, Republic will continue to offer more performance for less money.

Remember, if it's made of rubber, Republic builds it better. Contact your local Republic Distributor or write direct for a free analysis of your plant requirements.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

MALLEABRASIVE®*

(SHOT AND GRIT)

When Eddie Gutkowski, Cleaning Room Foreman at General Foundries, Milwaukee, decided to try Malleabrasive, he hoped to realize a 50% savings on maintenance and parts. "Actually," Eddie reports, "we have saved more than that!" What's more, "Malleabrasive costs far less *per ton of castings cleaned!*" Ray Maas, Maintenance Superintendent, agrees completely. "Malleabrasive lasts much longer than any other abrasive we have ever used," he says. And it turns out a cleaning job like the one you see above!

SEND FOR FREE TEST KIT

These are just two of the many foundrymen who have found Malleabrasive a real time-and-money-saver. Remember—Malleabrasive is *guaranteed* to outperform ordinary shot and grit in fair comparative tests. Write today for your free kit containing all the forms you need to run an impartial test. Address: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

Here's why Malleabrasive Saves You Money

MALLEABRASIVE

- *is designed for modern cleaning equipment*
- *wears out fewer machine parts*
- *lasts 2 to 4 times longer*
- *reduces cleaning costs up to 50%*
- *increases output of cleaned castings*

PLACE A TEST ORDER TODAY

Packed in orange striped 100-pound bags with this tag

*U. S. Patent #2184926 (other patents pending)

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

HERE'S AN AGITATOR YOU'LL LIKE...

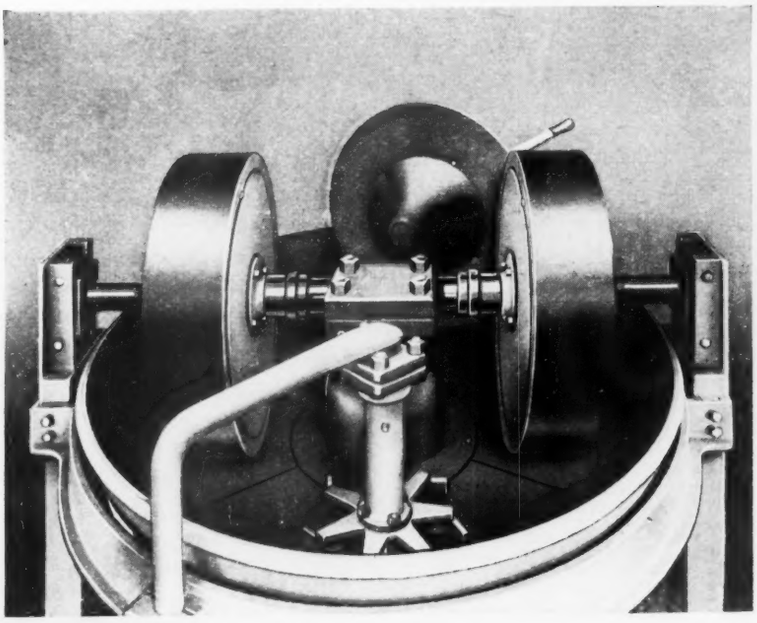
and it's in all

Clearfield Mixers

That star-shaped agitator in the pan of all Clearfield Mixers does a lot of stirring up. But it's sand, not trouble, that gets stirred and the result is six definite benefits to your sand preparation process:

1. Mixing proceeds more rapidly.
2. All lumps are broken down.
3. Formation of cakes is prevented.
4. Bottom surface freed of all material.
5. Sand quality is improved.
6. Clean emptying of pan is provided.

Whatever your sand preparation needs, there's a Clearfield Mixer with the star-shaped agitator to meet your problem. Write today for catalog No. 79 for complete details.



CLEARFIELD MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A

CLEARFIELD
MIXER
MIXES, TEMPERS
AERATES

Foundrymen are particular!

. . . Especially where new developments are involved.

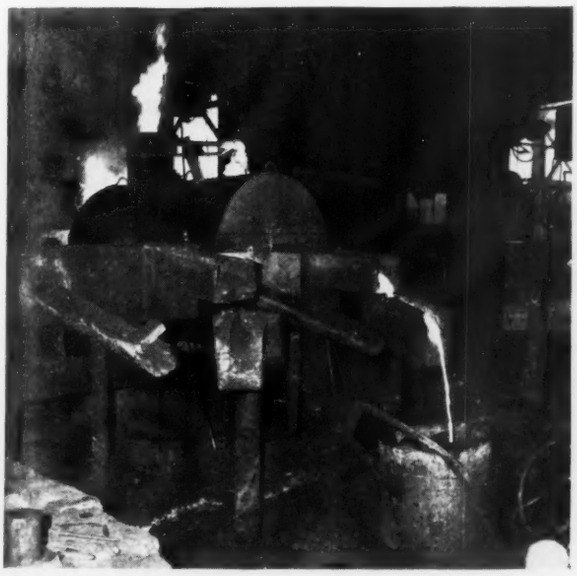
More foundries using Sodium Sesquicarbonate

Swing Increases After Praise by Prominent Metallurgist

SPECIAL — Use of sodium sesquicarbonate as a fluxing agent is becoming common practice in foundries all over the country. Relatively new among foundry fluxes, the material was "catching on" with increasing momentum. But its popularity grew by leaps and bounds when a prominent metallurgist chose it for sulphur removal in some important tests on the production of synthetic pig iron.

But they're sold on

SULTRON® flux



During actual tests, a prominent metallurgist found that in the forehearth, sodium sesquicarbonate cut sulphur below 0.050. Sodium sesquicarbonate is sold to the foundry industry only under the trade name SULTRON.®

Read the results of these tests, published in a recent trade paper article by a prominent metallurgist, and you will see why so many foundries are now using SULTRON® flux, which is sodium sesquicarbonate, or trona, in its natural state.

Commenting on the tests which were conducted during the production of synthetic pig iron, the metallurgist said, "After wide experiment, sodium sesquicarbonate was chosen for sulphur removal; used in its natural state, this material produced less erosion in the forehearth with equal removal properties at less cost."

It's the same success story in foundries all over the country where SULTRON® is now being used.

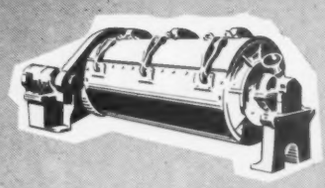
And remember! Sodium sesquicarbonate, or trona, may be obtained by the foundry industry only from the American Silica Sand Co. under the trade name SULTRON.® Take advantage of the free technical service available to help foundries fit SULTRON® into their own specific operations.

American
Silica Sand Co.
OTTAWA, ILL.

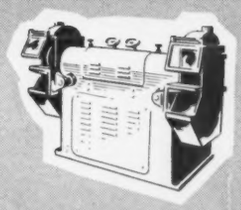
Suppliers of: Crude and dried crude silica sand • *SULTRON*® flux • Australian zircon sand • Zircon flour

®*SULTRON* is the trademark of Westvaco Chemical Division, Food Machinery and Chemical Corporation, for its brand of sodium sesquicarbonate.

DRACCO FILTERS CONTROL FOUNDRY DUST FROM ALL SOURCES

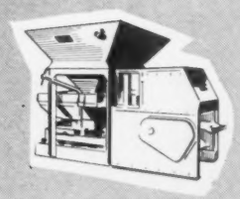


Tumbling mills

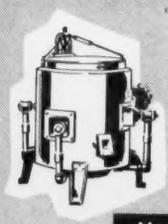


Snagging grinders

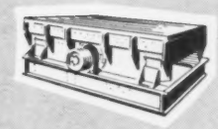
Portable grinders



Sand conditioning equipment



Melting furnaces



Shake-outs

Swing frame grinders

PROVED FOR YOUR FOUNDRY...

..BY *Thousands* OF INSTALLATIONS

High efficiency and long operating life of industrial dust control equipment depend on two important factors: (1) the dust control experience and engineering "know-how" of the manufacturer and (2) the quality of materials and operating life "built into" the system. Thousands of high-efficiency dust control units and systems designed and built by Dracco furnish operating proof of both these factors.

Thirty-five years' experience devoted exclusively to dust and fume control have provided Dracco engineers with invaluable design, engineering, and operating knowledge. This knowledge has enabled Dracco engineers to solve many dust problems—resulting in substantially improved operating conditions in all types of foundries.

When you think of dust control, remember DRACCO—the name, the engineering skill, and the dust control system that will successfully solve your problems.

DRACCO CORPORATION

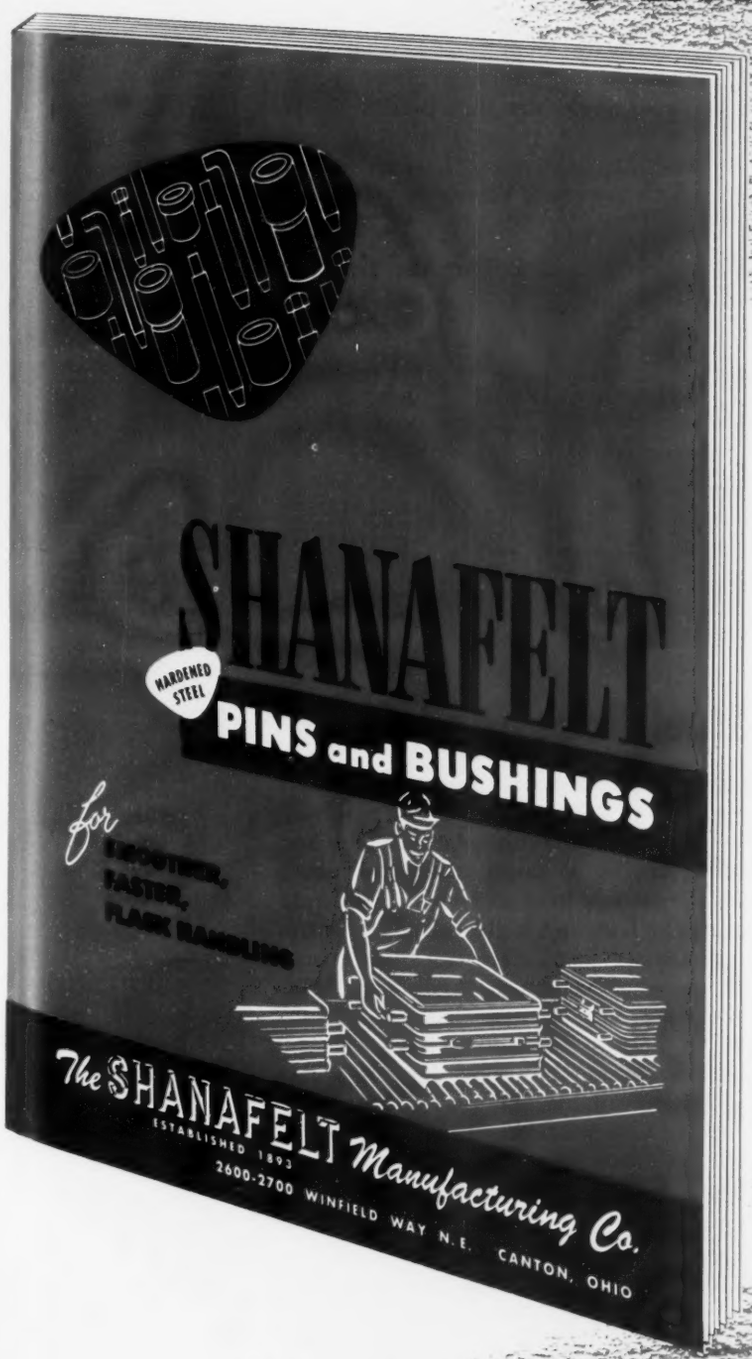
Harvard Ave. and East 116th St. • Cleveland 5, Ohio

Full information on Dracco equipment as applied to your specific problem may be had by contacting your nearest Dracco representative or Department G-6, Cleveland, O.

DRACCO *Performance Proved*

DUST CONTROL EQUIPMENT • PNEUMATIC CONVEYORS

Precision Made FLASK PINS and BUSHINGS



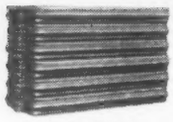
IF you are a bushing and pin user you will want a copy of this new catalog. It lists Shanafelt's complete line of hardened and ground bushings and pins, which are designed for smoother and better flask handling.

WE carry large stocks of practically all styles and sizes so your orders can be filled immediately.

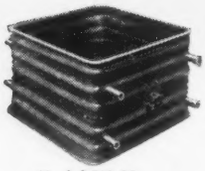
THE SHANAFELT MANUFACTURING CO.

Established 1893

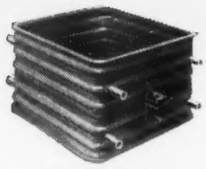
2600-2700 WINFIELD WAY N. E. CANTON, OHIO



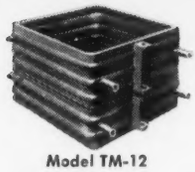
Model OM-2



Model TM-10



Model TM-11

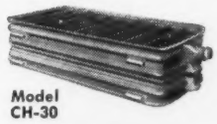


Model TM-12

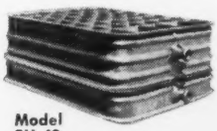
Truscon Steel Foundry Flasks

Every Truscon Steel Flask is built with great strength and rigidity to withstand heavy day-after-day punishment in foundry service. The ribs and flanges extend full depth around the entire flask without buckling or cutting away the metal. Every Truscon cope, drag and check is one integral piece of steel. There are no built-up sections that jar loose. The proper thickness of steel is used in every flask wall. Every detail of manufacture is given close attention in the efficient Truscon metal fabricating plant, which has many years of experience in flask production.

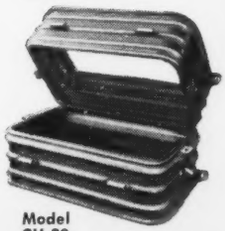
Write for illustrated literature describing the Truscon Steel Flask line available.



Model CH-30



Model CH-40



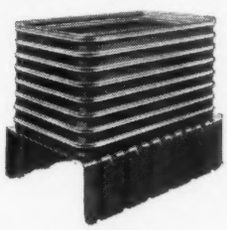
Model CH-20

The BIG NAME for the BEST SERVICE

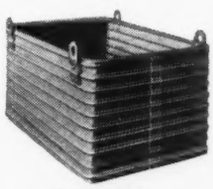
The Truscon Pressed Steel Division's central location assures quick, efficient service for your needs.

Truscon Steel Boxes and Skids

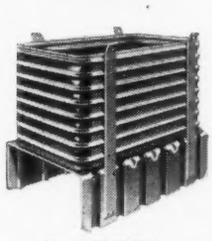
Truscon has scores of different types of steel boxes and skids to meet a wide range of materials handling requirements. And if your needs are something special, Truscon has the engineering ability to tailor-make the exact units you require. Truscon's long experience in steel box and skid design . . . Truscon's highly efficient facilities for production and service . . . Truscon's long association with box users in every branch of materials handling . . . these are *plus* features that make your dollar investment in Truscon Steel Boxes and Skids so much more profitable. Write for catalog showing wide range of Truscon Boxes available, and ask for an experienced Truscon man to help plan your needs efficiently.



Type PE-120



Type B-80C

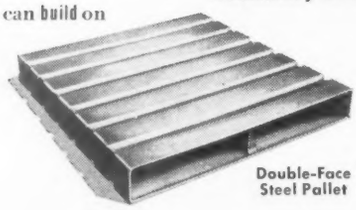


Type PB-120-L

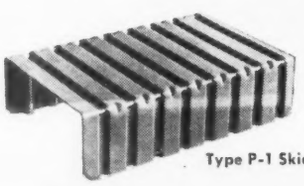
TRUSCON® STEEL COMPANY
PRESSED STEEL DIVISION
6208 Truscon Avenue • Cleveland 4, Ohio
Subsidiary of Republic Steel Corporation

TRUSCON
MARK OF MERIT PRODUCTS

TRUSCON . . . a name you can build on



Double-Face Steel Pallet



Type P-1 Skid Platform

Guide Posts ON THE ROAD TO LOWER FOUNDRY Costs

LINBOND CORE OILS — At the top for clean action. Several oils in this group will match Linseed in strength at a handsome saving in cost.

KORBOND CORE OILS—The answer for problem jobs. They have helped produce 80 ton steel castings, stainless steel and intricate grey iron work.

KORGLAZE—A vehicle for use with talc or graphite in coating cores and molds. It pays out with smoother castings and lower cleaning room costs.

TOP-BOND — A spray for green sand cores and molds which will air dry. It produces a firm hard surface and sharp edges that do not rub.

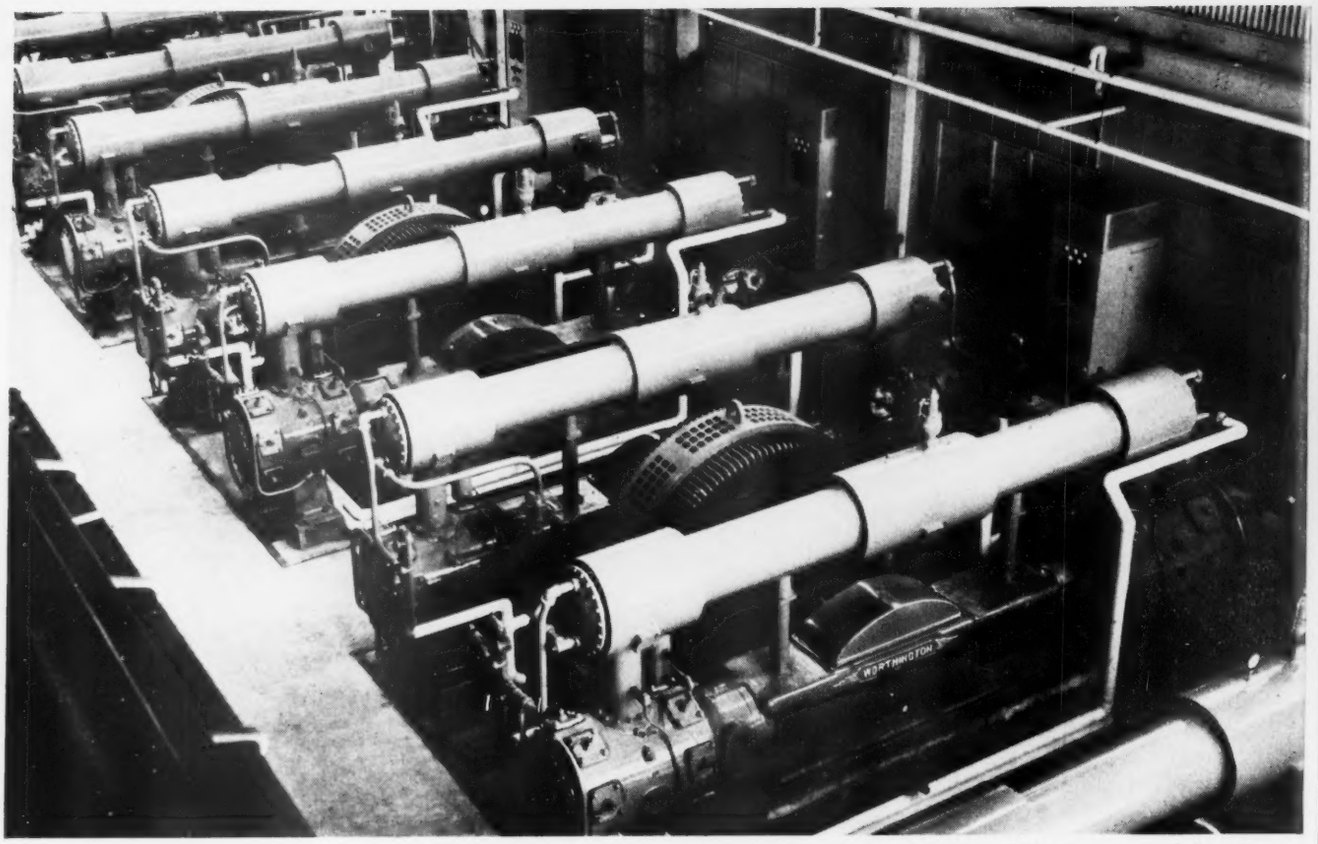
AQUA-SET — Our name for synthetic resin core binders. These are fast bakers that will double the capacity of any oven.

AQUA-BOND — An emulsified oil that favors low gas and a fast collapsing type of core. An aid to preventing hot cracks in thin walled castings.

Choose the one you could use right now and write for our latest bulletin.

UNITED OIL MFG. CO.

1429 WALNUT STREET, ERIE, PA.



SIX WORTHINGTON HORIZONTAL-DUPLEX COMPRESSORS—five ODC-2 water-cooled units (background, left) with 9414 cfm displacement each, and one DC-2 two-stage 1858-cfm unit—make up the entire air supply at the new Brookpark Village, Ohio, foundry and engine plant of Ford Motor Company. Foundry will produce all blocks and heads for the engine plant.

Ford installs 41,500 cfm of Worthington compressors to supply air to new foundry and engine plant

When you build a foundry and engine plant as large as those Ford Motor Company recently completed at Brookpark Village, Ohio, compressed air becomes a major consideration.

That's why you'll find they've installed six giant Worthington compressors in the power house that supplies compressed air to the foundry and engine plant together totaling over 2,000,000 square feet of floor space. Ford is expecting a lot of hard, continuous and efficient work from these big units—and the experience of industry everywhere says that they'll get it.

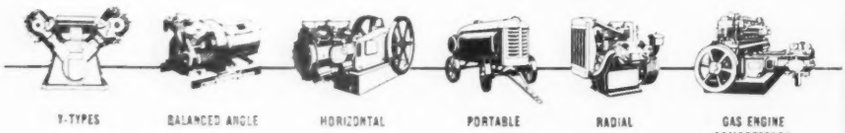
A mere look at these ruggedly built units suggests their dependability, but what surprises some new users is their high operating efficiency. Worthington horizontal compressors assure you of air as you need it . . . in the quantities you need—and most of all, they give it to you at the lowest possible cost.

Worthington features that mean lower operating and maintenance costs are: (1) *the variable capacity control* that provides exactly the air volume needed regardless of load conditions *also makes possible* lower operating temperatures at part loads, reduced part load power consumption, and minimum cylinder and ring wear with less carbon deposits on valves. (2) *Worthington's exclusive Feather* valve*—simplest, lightest, and most efficient valve made and (3) the high *efficiency intercooler* that needs less water, less power, less attention.

There's a Worthington compressor built to supply your compressed-air requirements dependably and efficiently. Write today for Bulletin L-675-B1B to Worthington Corporation, Compressor Division, Buffalo 5, New York.

*Reg. U. S. Pat. Off.

K.2.7



WORTHINGTON

Compressors

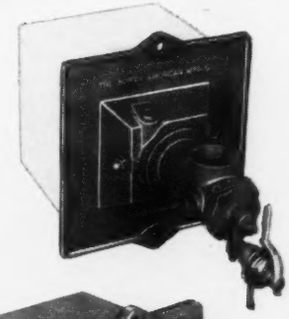
No Other Compressor Will Outperform a Worthington

Here to stay.. DUAL-FUEL* BURNERS

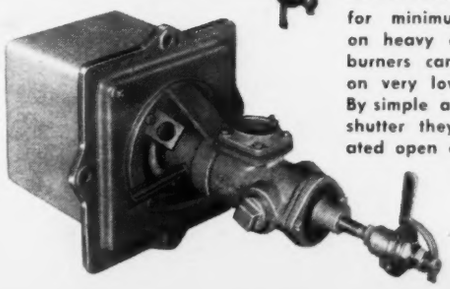
PIONEERED IN 1917 BY

North American

LUMINOUS OR LONG FLAMES
with either gas or oil are produced by the Series 113 Burners. They are desirable for vast coverage, for fewer burners and for uniformity of flame temperature.



SHORT FLAMES
are produced by the Series 221 Burners. These burners provide a highly stable and efficient fire, using either gas or oil. They are recommended wherever heating in a relatively small space is required.



RUGGED DESIGN
for minimum maintenance on heavy oil. Series 225 burners can also be used on very low gas pressure. By simple adjustment of the shutter they can be operated open or sealed-in.

COMPLETE SYSTEMS for GAS and OIL

Maximum Efficiency with Either Fuel

•

Switch Fuels Instantly

•

Automatic Fuel-Air Proportioning

•

Wide Turndown Range

•

Seven Burner Styles to fit any Type of Application

★ Dual-Fuel: The North American name for burners designed especially for both gas and oil. Fuel changed by merely turning valves.

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES
CLEVELAND 5, OHIO

Drive at pug mill of Gladding McBean & Co. Safety guard removed for photographic purposes

The Problem:

The drive at the pug mill at the Gladding McBean & Company brick plant, Pittsburg, California, is so vital to their production it cannot be out of service for any length of time. It must operate under dusty conditions which induce slippage in ordinary belts. It must be able to take very severe pulsating loads.

The Solution:

With the installation of rugged BWH Bull Dog V-Belts the problems and difficulties were completely overcome.

* * *

Do you have a drive or V-Belt problem? Call us for Bull Dog V-Belts and a space saving, dependable, trouble-free installation.

Another Quality Product of

BWH DEPENDABLE RUGGEDNESS

BOSTON WOVEN HOSE & RUBBER COMPANY

Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. · P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

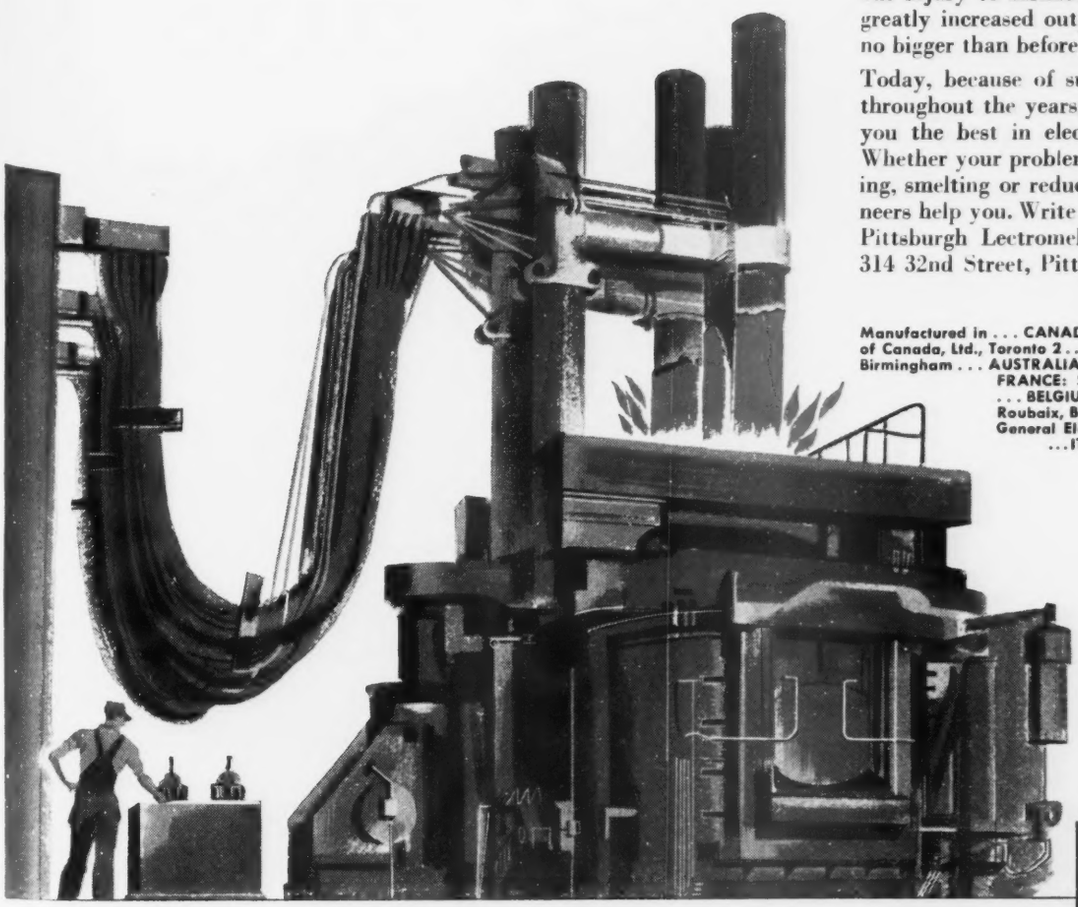
THEY THOUGHT IT COULDN'T BE DONE

but Lectromelt doubled electric furnace production by doing it!*

Other electric furnace designers said it couldn't be done. But Moore, inventor of the Rapid Lectromelt Furnace, dared to boost the power fed to arcs. Production zoomed as power input was pushed up. The day's work was doubled.

Lectromelt heavied up their construction generally, provided larger transformers and power leads, micro-accurate electrode control and more efficient cooling. That's how they got faster melting without injury to furnaces or charges, and greatly increased output from furnaces no bigger than before.

Today, because of such bold thinking throughout the years, Lectromelt offers you the best in electric arc furnaces. Whether your problem is melting, refining, smelting or reduction, let our engineers help you. Write for Bulletin No. 7, Pittsburgh Lectromelt Furnace Corp., 314 32nd Street, Pittsburgh 30, Penna.

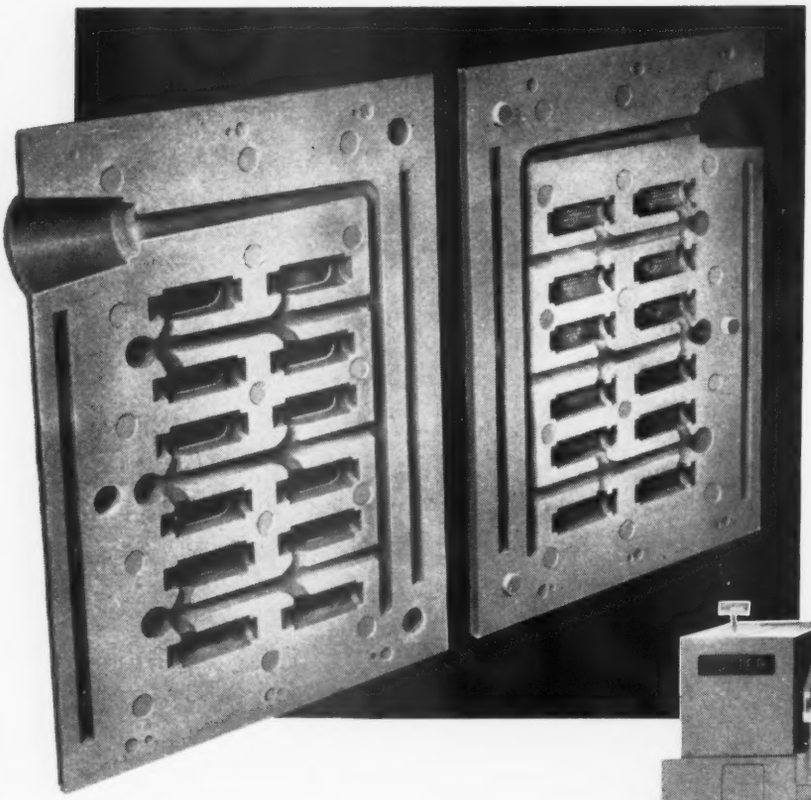


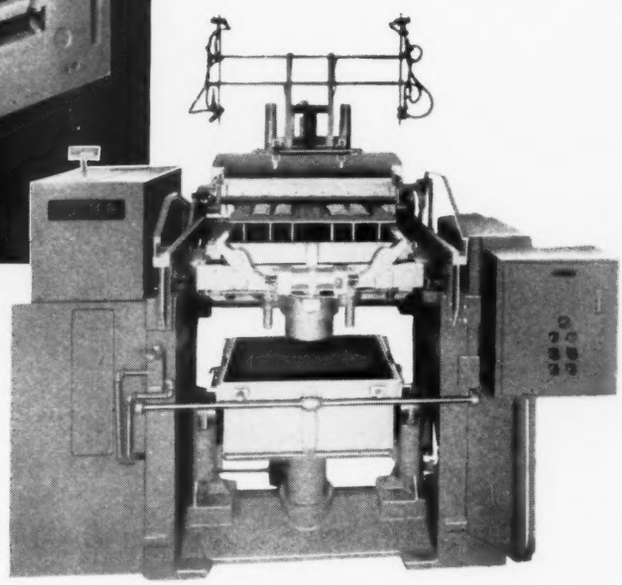
Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa

*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*

MAKE UP TO 60 OF THESE MOLDS PER HOUR





SUTTER

AUTOMATIC SHELL MOLDING MACHINES

SEND FOR BULLETIN S

This illustrated bulletin gives complete information on operation and construction of Sutter Shell Molding Machines. Send for yours today. There is no charge or obligation.

The amazing economies of completely automatic shell molding for production foundries today is a practical reality.

Sutter Shell Molding machines, featuring a completely automatic cycle, can produce up to 60 shell molds per hour per machine. And this can be accomplished with unskilled labor!

Quality shell production is maintained because of the elimination of the human element in this new method of mold production. Any operator of the Sutter Shell Molder needs only to push the starter button, remove completed shells, and occasionally load the ample resin bin of the machine. This means a tremendous saving in labor costs. Furthermore one operator can handle two machines with ease—result: production of 180 shells per hour by one operator!

These are but a few reasons for the acclamation throughout the world of Sutter Automatic Shell Molding Machines.

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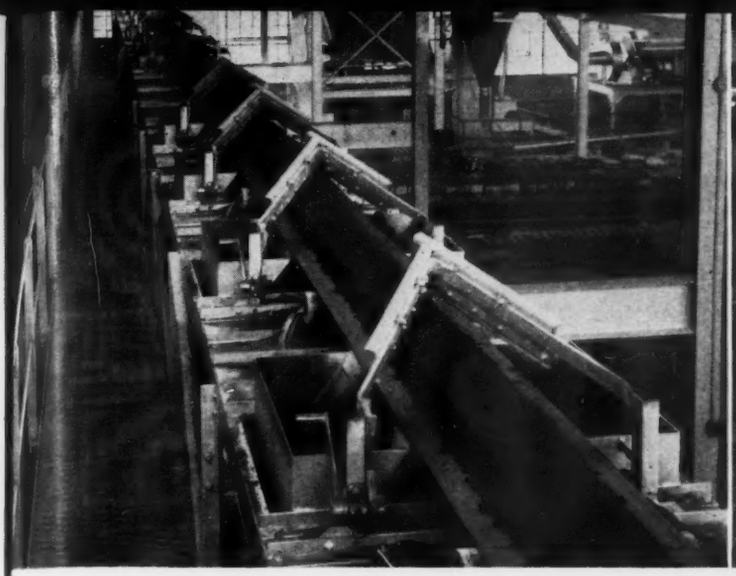

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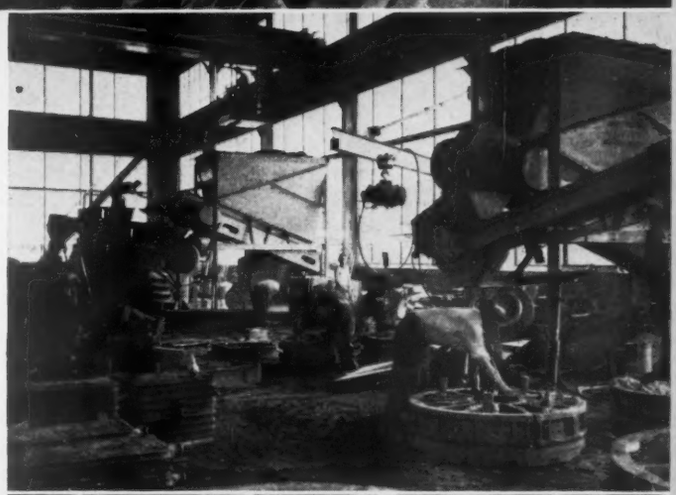

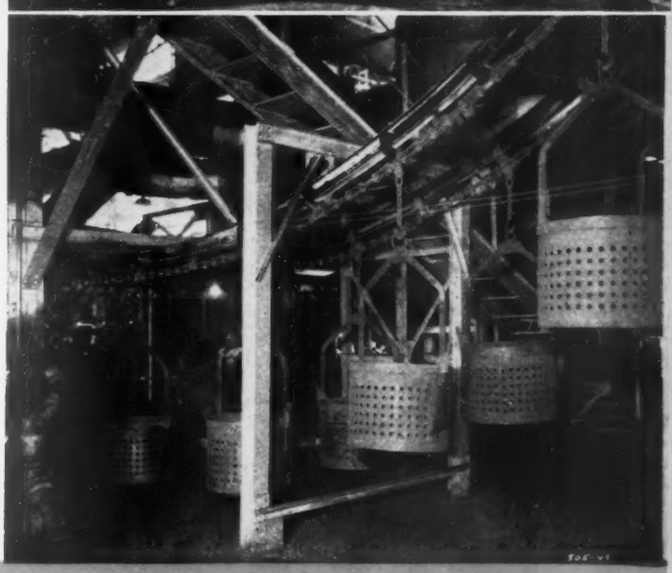

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BRASS CASTINGS FILL THE SPECIAL REQUIREMENTS OF MANY MANUFACTURERS

The free cutting characteristics of Brass are ideal in the manufacturing of all types of valves, impellors, plumbing fittings and other castings that require machining. This adjunctive feature provides for lower tool maintenance costs . . . more rapid machining, which in effect leads to increased production.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 8, No. 3 — containing an article discussing "Gates and Risers."

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Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

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REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 52 Years 1952 SERVING THE FOUNDRY INDUSTRY

"We've more than Doubled Core Production with relatively no rejects" —says Foundry Head

DESPATCH

TOWER TYPE

CORE OVEN

Installed at Progress Pattern and Foundry Co., St. Paul, Minn.

As many as eight tons of sand per eight-hour day can be handled in the modern core making layout at Progress Pattern. Cores of top quality and uniformity for all shapes of brass and aluminum castings are baked in this DESPATCH gas fired, tower type oven with relatively no rejects reported.

"With 80% of our output now going for Defense production it would be impossible to meet the strict time schedules and rigid Government requirements without our high-producing core room equipment," says Progress Management. "For example, our conveyorized Despatch Core Baking Oven with its automatically controlled heat and automatically controlled time cycle eliminates completely the human element in core baking and gives us uniform high-quality cores with every load. With its continuous conveyor, this oven also makes it possible to produce more cores faster with fewer core driers."

Write for full information to Dept. N.

NOT TO BE OVERLOOKED in the tower type oven design is the saving in floor space. This oven with 21 conveyor racks extends up approximately 30 ft. It occupies about ¼ the floor space of a horizontal oven of equal capacity.

MODERNIZE YOUR FOUNDRY with DESPATCH CORE OVENS FOR MORE PROFIT

Despatch engineers are ready to help you with your foundry problems. They will offer advice, or will design, build and install equipment in your foundry that will provide speed, plus uniformity and economy in all your core baking and mold drying operations.

FIFTIETH ANNIVERSARY

DESPATCH OVEN COMPANY

MINNEAPOLIS OFFICE: 619 S.E. 8th Street

CHICAGO OFFICE: 4554 N. Broadway

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CUTS CLEANING COSTS TO THE BONE... Because of its high fusion point... (well above 4000°F) TAM ZIRCONITE SAND ends burning-in and metal penetration of cores and molds. Easier shake-outs are promoted. These and other advantages will make it worthwhile for you to get detailed facts from our New York City office.

*TAM and ZIRCONITE are registered trademarks.

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NATIONAL LEAD COMPANY
Executive and Sales Offices: 111 BROADWAY, NEW YORK CITY
General Offices, Works and Research Laboratories: NIAGARA FALLS, N. Y.

Cut Core Costs These 14 Ways

See how Allis-Chalmers revolutionary system of drying sand cores dielectrically lowers foundry costs and improves your product.

1. Rapid baking — Takes but a few minutes; provides more production per unit of floor space.
2. Complete baking at lower temperature—means easier handling—less heat in core room—less fuel used.
3. No burning, no overbaking — It's impossible to overbake edges or thin sections.
4. Low core scrap! Cores are hard and dry the minute they come out of the oven. This reduces breakage in handling.
5. Minimum core storage space — Cores can be made up as needed . . . no need to build up stock.
6. Excellent shakeout characteristics.
7. Lower casting rejects — Cores are *completely* cured.
8. Cores usable at once — No cooling required. Core making can be placed right in casting production set-up.
9. Good collapsibility.
10. No oven warm-up — Unit is ready to go at once. Saves fuel.
11. Good dimensional stability in cores.
12. Smoke and fumes minimized.
13. Smoother casting surface.
14. Cost of oven operation is low.

Get complete details on the *Foundromatic* Sand Core Dryer. Call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

QUESTIONS and ANSWERS

About Dielectric Sand Core Drying

Do I need an electronic engineer to help me?

No. Once equipment is installed and operating, any personnel can be quickly trained to follow operating instructions.

How much maintenance is there?

Very little. Periodic oiling of conveyor and blower motors and rollers and replacement of tubes.

Why are resin binders used in place of core oils?

Core oils require high temperatures and long drying time for complete polymerization. Resin binders cure at lower temperatures . . . approximately 250 F.

What about collapsibility?

Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

I want a very hard core, but still want good collapsibility. What do I do?

Spray the cores with a film of moisture just before putting them on conveyor belt. This will give high surface hardness without affecting collapsibility.

Can core rods or nails be used?

Yes. When rods or nails are parallel to electrodes no trouble is encountered. When rods or nails are placed vertically in the core they should be of minimum size in relation to core mass and should not protrude through surface of sand.

Will light sections burn if dried with heavy sections?

No. Cores will not burn in the *Foundromatic* core dryer.

SEND

Allis-Chalmers
Milwaukee 1, Wisconsin

Please send me new 8-page booklet 15B7306B containing complete information on the *Foundromatic* sand core dryer.

Name .....

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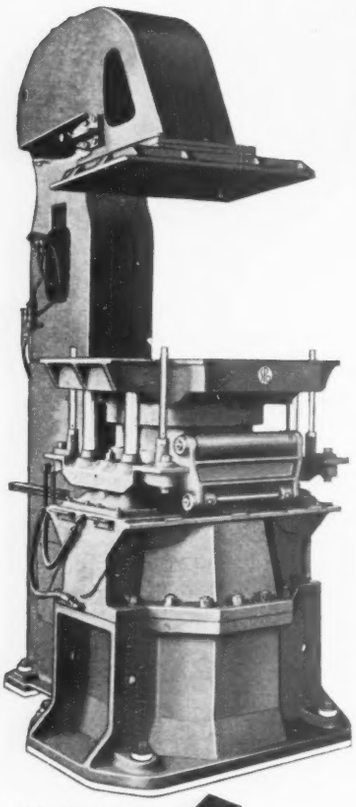
Use

FABREEKA

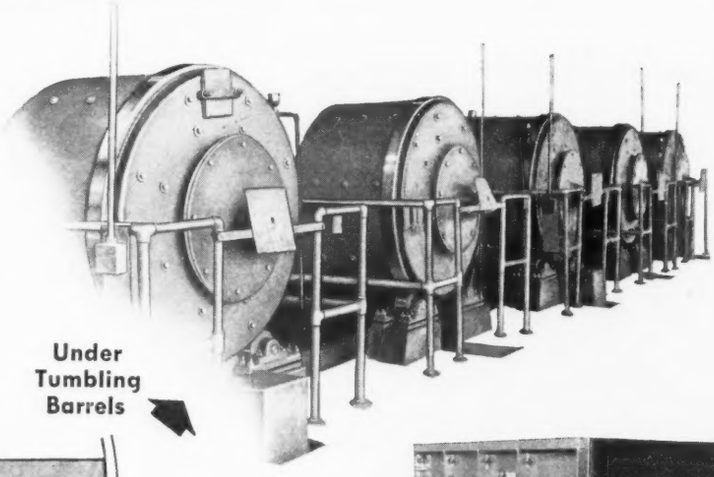
UNDER FOUNDRY EQUIPMENT

TO REDUCE SHOCK, VIBRATION AND MAINTENANCE and to INCREASE PRODUCTION

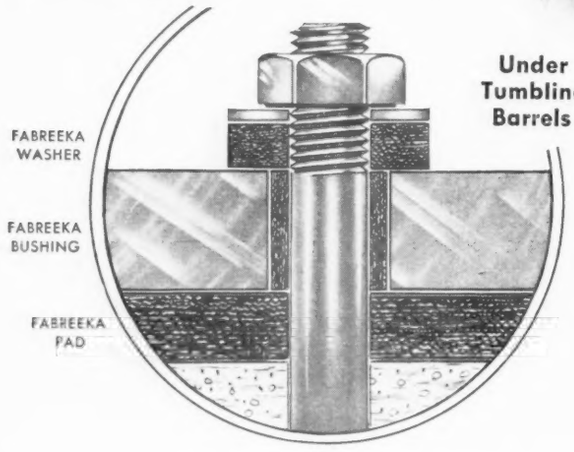


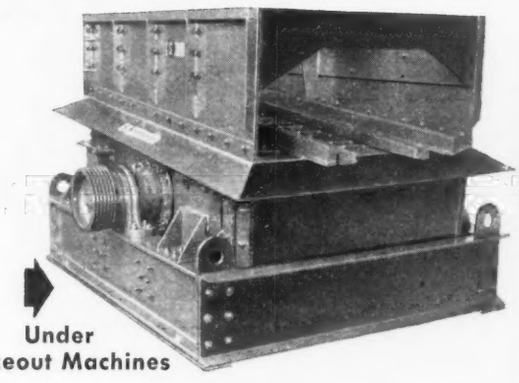
Under Molding Machines

FABREEKA PADS, Bushings and Washers are installed under Molding Machines, Shakeout Machines, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.



Under Tumbling Barrels





Under Shakeout Machines

FABREEKA has been used many years for mounting heavy machinery where absorption of impact shock and isolation of transmitted vibration is desired. **FABREEKA** distributes the load properly; prevents cracking and flaking of concrete; eliminates the need for grout; prolongs the life of machines and building.

FABREEKA also reduces noise, helps maintain alignment, reduces maintenance and breakdowns. **FABREEKA** is scientifically constructed to give years of service under the most severe operating conditions.

FABREEKA PRODUCTS COMPANY, INC.

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Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How Manganese Briquets Control Sulphur

. . . Produce Cleaner, Sounder Iron Castings

The use of manganese briquets in the cupola charge provides a convenient and accurate method of controlling this important element in cast iron. Accurate control of the manganese level is essential for the consistent production of high-quality iron. While manganese will be introduced in varying amounts by the pig iron and scrap, a supplementary source—such as manganese briquets—is usually essential if accurate analysis control is to be maintained.

Manganese has two important functions in cast iron:

1. It acts as a sulphur-neutralizing element when used in small amounts — up to roughly six times the sulphur content.
2. It acts as an alloying element, imparting density and strength when present in amounts greater than necessary to perform its desulphurizing function.

Neutralizes Sulphur

Cast iron tends to run considerably higher in sulphur than was the case a decade ago because there has been an increase in the sulphur content of both scrap and foundry coke in recent years. Unless sufficient manganese is provided in the cupola mixture, this higher sulphur content will tend to produce a hard, brittle metal with deep chilling properties and poor fluidity. Castings of such metal are difficult to machine and may be the cause of many foundry troubles, including strain cracking, chilled corners and edges, and misrun castings.

Since manganese has a high affinity for sulphur, it forms manganese-sulphide inclusions when present in sufficient amounts. These inclusions are relatively harmless to the metal, and the detrimental effects of the sulphur content are thus largely eliminated. It is good practice to maintain a manganese-sulphur ratio of approximately 6:1 to insure proper neutralization of the sulphur content.

A certain proportion of the manganese-sulphide that is formed will float to the surface of the molten iron and be absorbed by the cupola slag. In this way, manganese actually eliminates a portion of the sulphur introduced by cupola melting. Thus, relatively high manganese irons will invariably run lower in sulphur than will metal melted from similar raw materials but of lower manganese content.

Sounder Castings

The cleansing effect of manganese is a decided help in producing a high-quality foundry product with a minimum amount of trouble from porosity, shrinks, and blows. Manganese helps to neutralize gassy metal that may result from temporarily unbalanced cupola conditions or poor-quality melting materials. It improves the fluidity of iron that may be a little on the cold side or high in sulphur. Manganese does a general cleansing job that is helpful in avoiding slag inclusions, which have a detrimental effect on machinability.

Alloy Effects

When manganese is used in amounts greater than that necessary to neutralize sulphur, it acts as a desirable carbide-stabilizing alloy in cast iron. Depending on the amount added and other elements present, manganese tends to refine pearlite and, at higher levels, to form martensite. Increasing the normal percentage of manganese in cast iron to 1 per cent or above will often change a normally ferritic-pearlite matrix to the stronger all-pearlitic structure.

Two Types of Briquets

ELECTROMET produces two types of manganese briquets — EM silicomanganese briquets and EM ferromanganese briquets. The silicomanganese type is square in shape and contains exactly 2 lb. of manganese and about ½ lb. of silicon. Ferromanganese briquets, which are oblong in shape, also contain exactly 2 lb. of manganese, but do not contain silicon.

The recovery of manganese from EM manganese briquets normally runs about 85 per cent, because the briquets are made with a binder that prevents oxidation until the alloy unites with the iron in the melting zone of the cupola.

A typical mixture for high-strength iron is given in the accompanying table. For further information—

The terms "EM" and "Electromet" are registered trade-marks of Union Carbide and Carbon Corporation.

Typical Cupola Charge for Producing High-Strength Iron With EM Briquets

Base Charge			Alloys in Charge Material			
			Silicon		Manganese	
%	Lb.	Material Charged	%	Lb.	%	Lb.
15.0	150	Pig Iron	2.30	3.45	0.70	1.05
40.0	400	Steel Scrap	0.10	0.40	0.45	1.80
35.0	350	Return Scrap	1.90	6.65	1.00	3.50
10.0	100	Purchase Scrap	2.00	2.00	0.45	0.45
100.0%	1,000 lb.	Total Base Charge		12.50		6.80
Briquets Required		7½ Small Silicon		7.50		—
		2½ Silicomanganese		1.25		5.00
		Total Alloys Charged		21.25 lb. Si. or 2.12% Si.		11.80 lb. Mn. or 1.18% Mn.
		Melting Recovery Factor		x .90		x .85
		Final Analysis of Iron		1.90% Si.		1.00% Mn.

SEND FOR FREE BOOKLET

Electro Metallurgical Company
Technical Service Department
30 East 42nd Street, New York 17, N. Y.

Please send me a copy of the booklet "Briquetted Alloys for the Iron Foundry Industry".

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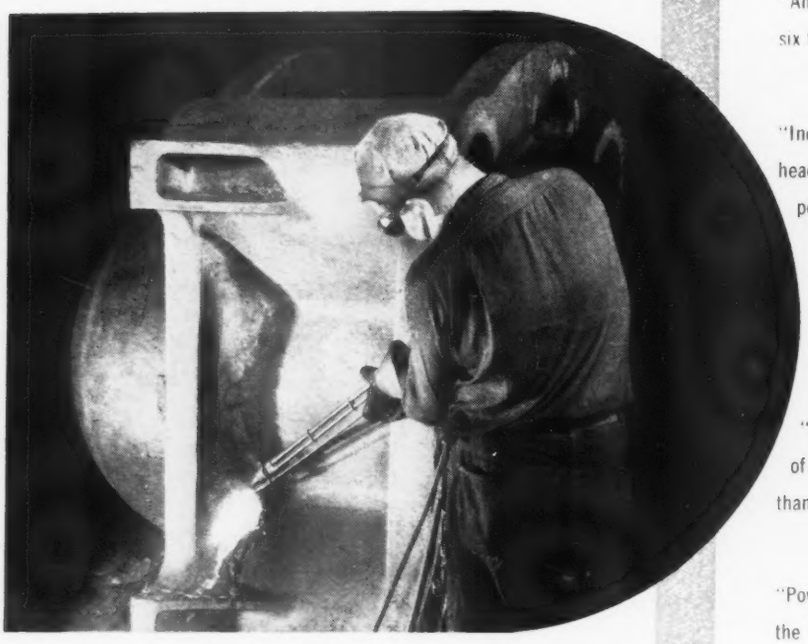
POWDER-WASHING SPEEDS CLEAN-UP

Removes excess and defective metal quickly, easily, and at low cost



Cleaning-floor bottlenecks eliminated, production up, costs down, scraps and recasts negligible—that's the gist of enthusiastic reports on LINDE's powder-washing process.

Powder-washing combines the quiet speed of oxygen-cutting with a surface quality comparable to finish grinding. It removes fins, pads, sand inclusions, penetrations, burned core sand, chill bars, nails, chaplets, cracks and tears. It finishes flat or uneven surfaces to close tolerances with equal ease. And the powder-washing flame gets into places where other equipment can't.

Powder-washing can be applied to any carbon or alloy-steel casting. Equipment is simple. Technique is easily mastered in a short time.

For further details, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Dominion Oxygen Company, Limited, Toronto.

WHAT DO FOUNDRYMEN SAY ABOUT POWDER-WASHING?

"... powder-washing does for us in two hours what required one day of chipping."

*

"An hour of powder-washing has replaced four to six hours of grinding."

*

"Increased production and reduced labor and overhead more than make up for the cost of gases and powder consumed."

*

"... the equivalent of four days' chipping in one and one-half hours."

*

"... a casting which formerly required one hour of grinding is cleaned by powder-washing in less than five minutes."

*

"Powder-washing cleaned one casting in an hour, the other in 30 minutes. Conditioning by chipping and grinding would have taken three and two days respectively."

*

"... removed the shifted cores and penetrations with a saving of several hundred man hours."

*

"... in a few hours, cleaned up housings that otherwise would have had to be scrapped."

*

"... washed out a layer of sand from inside the cylinder in less than two hours, a job we could have done with no other available equipment."

LOOK TO *Linde* Trade-Mark **know-how . . . show-how . . . products and processes FOR WELDING, CUTTING, TREATING, FORMING METALS**

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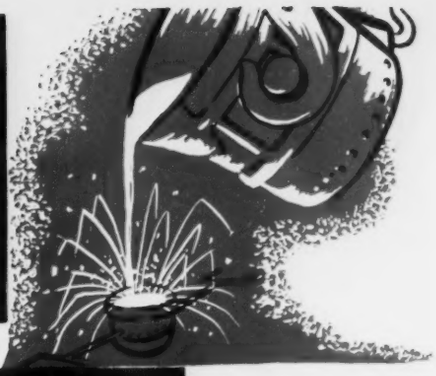
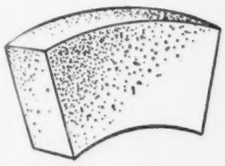
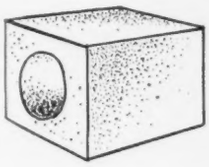
For Longer Lining Life Use . . .
WALSH Missouri-Quality REFRACTORIES for the FOUNDRY INDUSTRY







FIRE BRICK

Brand	Type	Fusion Point	Uses
WARCO XXT (Missouri High Heat Duty)	Dearied Stiff Mud	Cone 32-33 (3173° F.)	Metallurgical furnaces where slag and abrasive action is severe. Malleable furnace side walls.
BUNG BRICK (Missouri Super Duty)	Dry Press	Cone 34 (3200° F.)	Malleable furnace roofs.
MULLITEX (Missouri Super Duty	Dry Press	Cone 34 (3200° F.)	Furnaces operating at high temperatures with sudden temperature changes. Malleable furnace bottoms and roofs, non-ferrous furnace linings.
MULLITEX HB (Missouri High Burn Super Duty)	Dry Press	Cone 34 (3200° F.)	Highly resistant to slag, abrasion, shrinkage and sudden temperature changes. Electric furnace roofs ferrous and non-ferrous furnace linings.
APEX (Missouri Extra Duty)	Dearied Stiff Mud	Cone 34-35 (3200-3245° F.)	Wherever high temperatures, slag, abrasion and corrosive action prevail.

Walsh also makes: Cupola Blocks, Tap Out Brick, Slag Hole Block, Ladle Bottoms, High Temperature Ferrous and Non-Ferrous Furnace Linings.

PLASTICS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK (Missouri Super Duty with Graphite Base) (Wet or Dry)	3000° F.	Cone 33-34	500 lb. drums 100 lb. cartons 100 lb. bags	Air & Heat Setting	For ram lining bull ladles, spouts, runners, patching, where molten metal covers and forms seal resulting in longer life, cleaner castings.
K-11 PLASTIC (Wet or Dry)	3200° F.	Cone 36-37	100 lb. cartons 225 lb. drums 500 lb. drums 100 lb. bags	Air & Heat Setting	Withstands electric furnace temperatures and conditions. Excellent for rammed linings, spouts, runners, burner ports, pit furnaces, patching.

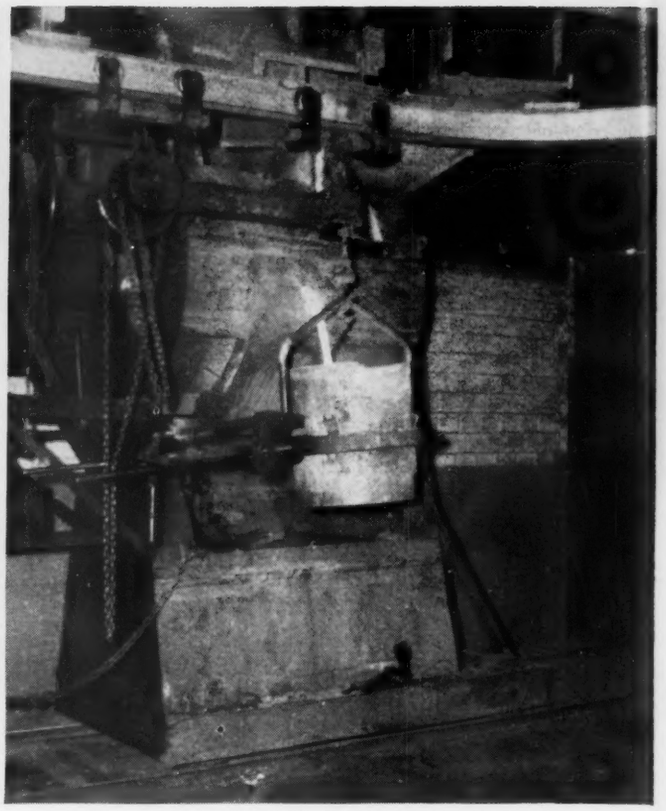
CEMENTS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK LADLE COATING (Dry) (Missouri Super Duty with Graphite Base)	3000° F.	Cone 33-34	100 lb. bags	Heat Setting	For brush coating over Graflok Plastic. Affords added protection and longer life.
MULLITEX CEMENT (Wet or Dry)	3150° F.	Cone 34-35	100 lb. bags 200 lb. drums 500 lb. drums	Heat & Air Setting	For laying up and surfacing fire brick subjected to severe joint erosion.
METALOK (Missouri Super Quality Mortar—Dry)	3200° F.	Cone 36	100 lb. bags	Heat Setting	Unusually resistant to slag action—highly suitable for laying up fire brick in malleable furnace sidewalls, ladles, hot metal mixers, electric furnaces, etc.

WALSH
REFRACTORIES CORPORATION
ST. LOUIS MISSOURI U.S.A.

Walsh also supplies the foundry with Fire Clays, Ground Fire Clays, Milled Foundry Clays, Super Duty Plastic Furnace Linings, Castables and other Refractory Specialties.

101 FERRY STREET, ST. LOUIS 7, MISSOURI
FACTORIES: ST. LOUIS AND VANDALIA, MISSOURI



Left: **DESULPHURIZING LADLE** for handling gray iron being lined with a special Norton ALUNDUM* refractory cement.
Right: In operation, ALUNDUM cement lining lasts 2 to 4 times longer than other linings.

Desulphurizing ladle linings last up to 4 times longer
. . . with Norton ALUNDUM cement

How long do your present ladle linings stand the violent boiling action that results when you add sodium carbonate briquettes to desulphurize your gray iron?

Not long enough? Change to a special Norton ALUNDUM refractory cement and see what happens.

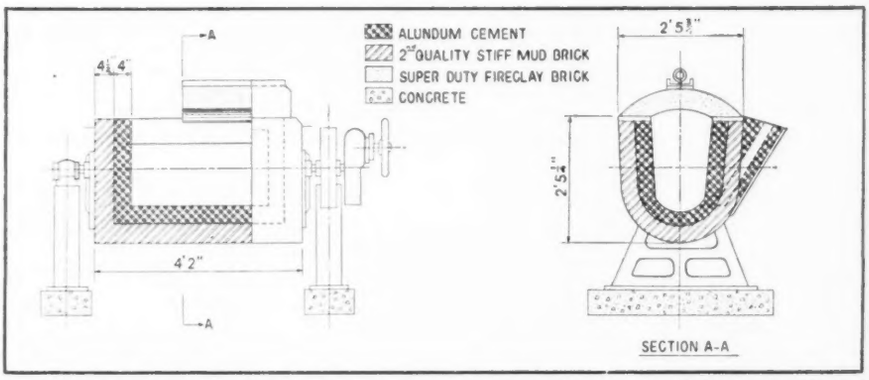
Test Shows Amazing Results

In one case, a foundry which operates a 1500 lb. capacity Whiting "U" shaped ladle for desulphurizing gray iron decided to test ALUNDUM cement. Lining life was increased 200-400%.

This foundry has now standardized on Norton ALUNDUM cement . . . and gets extra dividends in the form of easier installation, lower maintenance cost, lower over-all refractory cost.

Run a Test Yourself

Yes, why don't you test Norton ALUNDUM cement in your ladles, too? In the meanwhile, get further information from your nearby Norton representative — or write direct to NORTON COMPANY, Refractories Division, 306 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.



NORTON ALUNDUM CEMENT, in the test mentioned, was air-hammered 4" thick over 4½" of second quality stiff mud brick in the ladle and the entire spout. This was air dried overnight . . . and heated gently with a low-flame gas torch until thoroughly dried. Finally, the ladle was brought up to full heat and put into service.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

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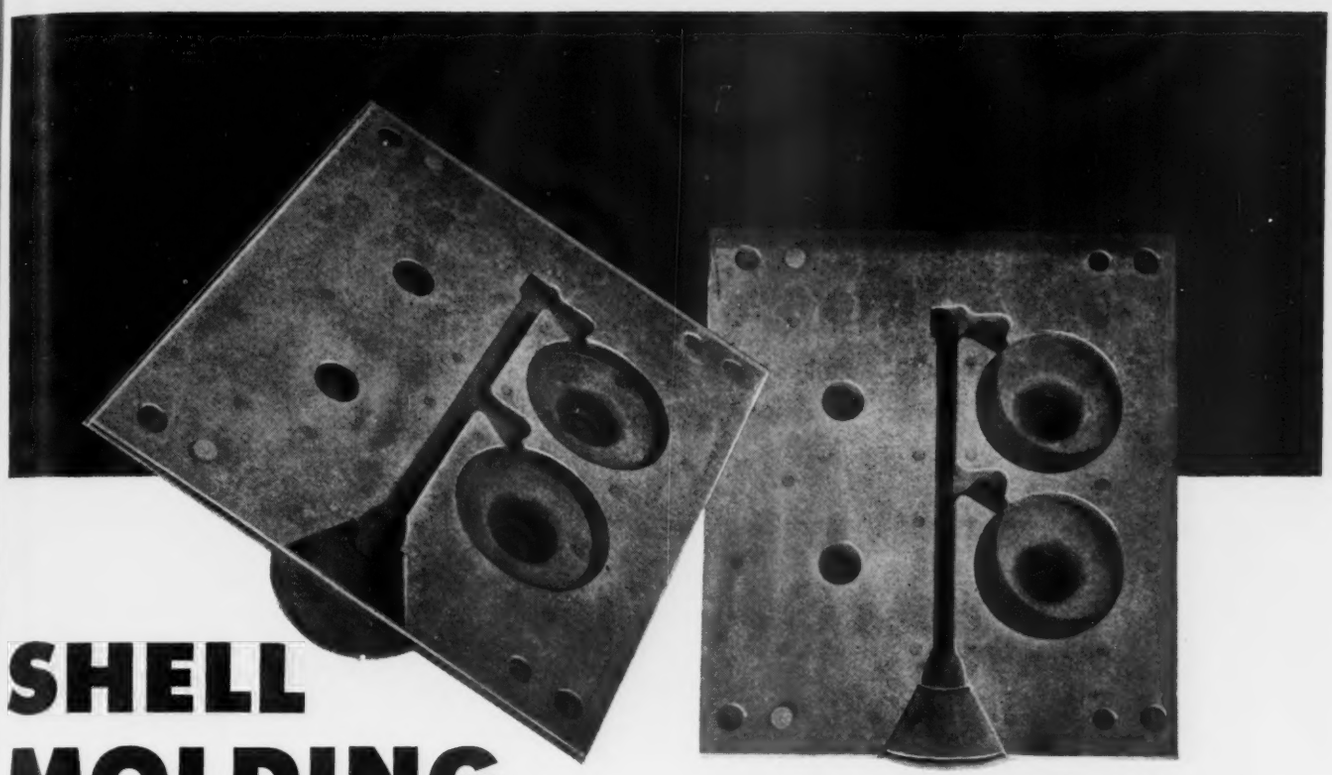
Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS



SHELL MOLDING

with *BAKELITE* Phenolic Resins means better castings, faster production, all-round economy...

Foundries and users of castings can both benefit from the new shell molding process. It utilizes thin, lightweight shell molds made of fine-grained sands bonded with BAKELITE Phenolic Resins. It produces ferrous and non-ferrous castings that are almost pattern-smooth. It results in greater efficiency in foundry practices, and promotes important savings by reducing machining costs. Here are some specific advantages:

FOR FOUNDRIES

- Molds are light in weight, are easily handled and moved about.
- Molds can be stored until needed without deteriorating.
- Ninety to ninety-five per cent less sand is used.
- More good castings are yielded per ton of metal poured.
- Laborious surface finishing of castings is reduced.

FOR USERS OF CASTINGS

- Castings have almost pattern-smooth surfaces.
- Pieces are cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.
- Higher percentage of sound, uniform castings means fewer rejects.
- Better detail minimizes machining operations.

Casting by Walworth Company, New York 17, N. Y.

BAKELITE
TRADE-MARK

PHENOLIC RESINS FOR SHELL MOLDING

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.

In Canada:
Bakelite Company (Canada) Ltd., Belleville, Ont.

Learn more about Shell Molding!
Send for this Free Booklet!

BAKELITE COMPANY, Dept. EN-29
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Please mail my free copy of the Booklet C-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

Name _____ Title _____

Company _____

Street _____ City _____ Zone _____ State _____

2 FAVORITES

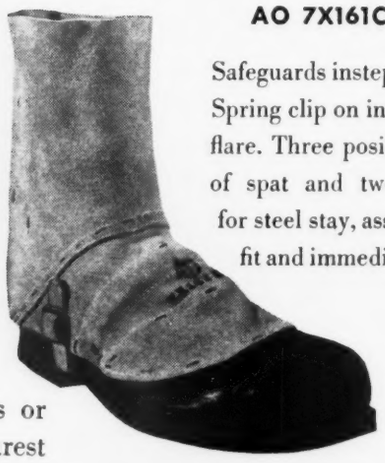
in Leg and Foot Protection Against Heat, Sparks, Hot Metal Splashes

PROTECTIVE CLOTHING

These AO Leggings and Spats are favorites because they combine *practical* design with *selected* chrome-tanned cowhide leather. Result: a big value in protection, comfort and flexibility!

AO 7X160CL LEGGING

Protects lower leg, ankle and instep. Popular because of its unusual design and features. Spring clip on instep holds flare in position. Has three positions at top of legging and two positions at ankle for steel stay, permitting snug fit and immediate release.



AO 7X161CL SPAT

Safeguards instep and ankle. Spring clip on instep to hold flare. Three positions at top of spat and two at ankle for steel stay, assuring snug fit and immediate release.

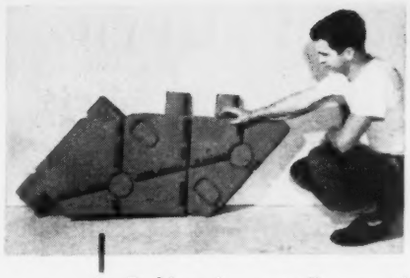
Both the Legging and Spat are also available in asbestos or flame-resisting duck, under different model numbers. Your nearest AO Safety Products Representative can supply you.

AO's Industrial Vision Program increases production, decreases accidents. Write today for new booklet "Improved Industrial Vision" to 109 Vision Park, Southbridge, Mass.

American Optical COMPANY

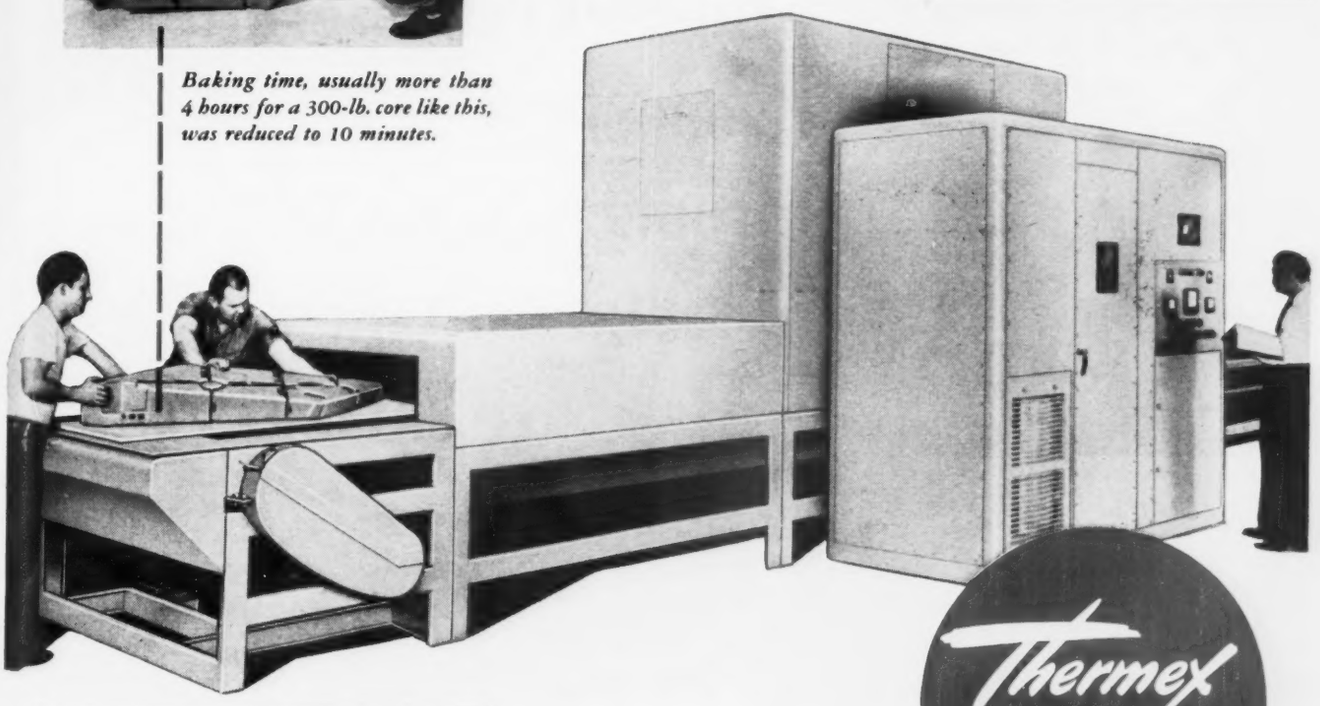
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



Baking time, usually more than 4 hours for a 300-lb. core like this, was reduced to 10 minutes.

300-lb. core baked in 10 minutes!



Partial List of Companies Who Have Purchased Thermex Electronic Core-Baking Equipment

Albert Lea Foundry Co.
American Brake Shoe Company
American Hardware Corporation
American Valve Co.
Atlantic Steel Castings Co.
Ph. Bonvillain & E. Ronceray
Boose Aluminum Co.
Brugger Mfg. Company
Cadillac Malleable Co.
James B. Clow & Sons
Crane Company
Drake Non-Clinkering Furnace Block Co., Inc.
Ford Motor Company
Fundicao Tupy
Grand Haven Brass Foundry
Grinnell Corporation
International Harvester Co., Ltd.
McWane Cast Iron Pipe Co.
Moline Malleable Iron Company
Mueller Company
National Malleable & Steel Castings Company
Ontario Malleable Iron Co., Ltd.
Phoenix Brass Fittings Corp.
Repcal Brass Mfg. Co.
Rolle Manufacturing Co., Inc.
Ronci Company, Inc.
Sterling-Faucet Company
U. S. Pipe & Foundry Company
Walworth Company

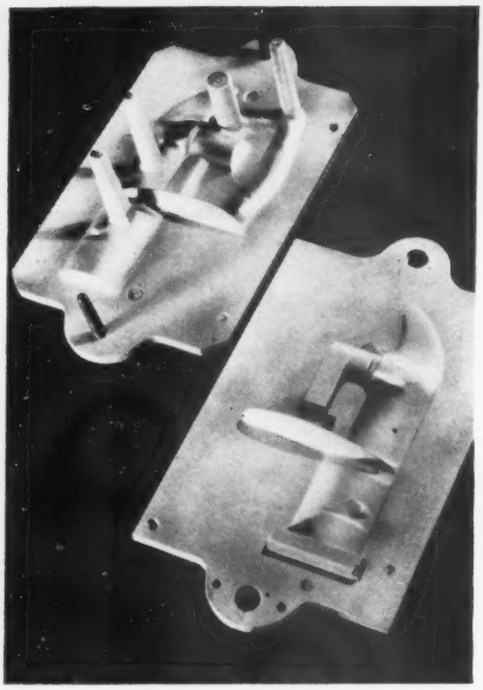
BIG OR SMALL . . . this THERMEX* Core-baking Unit takes them all in stride at a rated capacity of 3500 pounds per hour. Speed . . . the factor that cuts costs, increases profits and brings in business is the outstanding advantage of this big, versatile core baking unit.

Foundries using THERMEX Core-baking Equipment report greater core room yields, since rejects are sharply reduced. Castings have fewer irregularities. Uniform heating eliminates stresses, and greatly improves dimensional stability.

Take advantage of this cost-cutting equipment *now*. Let a Thermex field engineer study your operations, and make recommendations. Write The Girdler Corporation, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

the GIRDLER Corporation
THERMEX DIVISION



Foundries and Pattern Shops may now order Cast Aluminum Pattern Plate from stock! This new product, Alcoa Tool and Jig Plate, offers impressive savings.*

▶ A plate that is moderately priced

▶ Excellent for cope and drag plates, core blower plates and match plates...cut to any dimension

▶ Available in 11 different thicknesses from 1/2" to 4" ...maximum size 48" x 96"

▶ A cast plate strain relieved, machined both sides. Thickness is held within ±.010"

* *For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office . . . or Aluminum Company of America, 1949- Gulf Bldg., Pittsburgh, Pa.*

ALCOA

TOOL AND JIG PLATE

Alike as—

Can you tell which of these magnified sand grains are new and which are reclaimed foundry sand? We can't.

All of which serves to illustrate our point—that sand reclaimed with a Nichols Sand Reclamation System is just as good as new—saves money, too.

Write for Bulletin 222

Nichols Sand Reclamation Systems

Nichols Engineering & Research Corp.

70 PINE ST., NEW YORK 5, N. Y.

1920 N. Meridian St., Indianapolis 2, Ind.
40 S. Los Robles Ave., Pasadena 1, Calif.
1477 Sherbrooke St., W., Montreal 25, Canada

Welcome to our new home!

See how you get better service in portable tools from our 25th Anniversary Plant!

You'll be excited too when you see our new home at 26300 Lakeland Blvd. What a set-up to give you better portable tools and better service!

Air conditioned. The whole plant! Clean, dry air for high-precision work. Greater working comfort steps up our service to you . . . in quality and speed.

More production. Modern, top-rated tools and more of them. More space. Good light! . . . 55 foot-candles average.

Fast Service. Greater facilities for application engineering help. Large stock room for fast parts service.

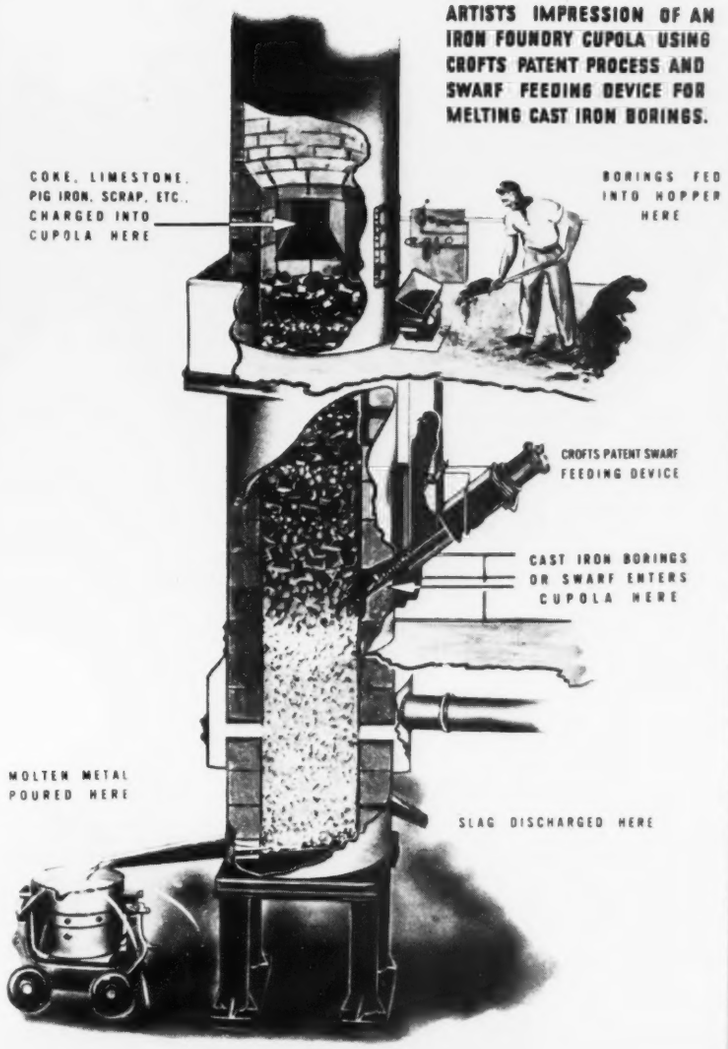
Come see this new plant! Or, write for our circular which tells all about it . . . what it means to you.

Air O'Tool and Hi-Cycle O'Tool

"CROFTS PROCESS"

FOR MELTING CAST IRON BORINGS, CHIPPINGS AND OTHER MATERIALS IN IRON FOUNDRY CUPOLAS . . .

PATENTS PENDING


COKE, LIMESTONE, PIG IRON, SCRAP, ETC., CHARGED INTO CUPOLA HERE
BORINGS FED INTO HOPPER HERE
CROFTS PATENT SWARF FEEDING DEVICE
CAST IRON BORINGS OR SWARF ENTERS CUPOLA HERE
MOLTEN METAL POURED HERE
SLAG DISCHARGED HERE

ARTISTS IMPRESSION OF AN IRON FOUNDRY CUPOLA USING CROFTS PATENT PROCESS AND SWARF FEEDING DEVICE FOR MELTING CAST IRON BORINGS.

● FOR THE FIRST TIME WE ARE ABLE TO INTRODUCE TO THE FOUNDRY INDUSTRY A NEW, POSITIVE AND ECONOMICAL PROCESS FOR MELTING CAST IRON BORINGS OR CHIPPINGS IN IRON FOUNDRY CUPOLAS.

● The operating principle is both simple and foolproof. It consists of directly injecting Cast Iron Borings or Chippings (as received from Machine Shops without any preparation) into the Cupola at a position just above the Melting Zone whereby the weight of the mass of the normal Charge prevents the ejection of the Borings by the Cupola blast. The Cast-Iron Borings immediately enter the Melting Zone and are rapidly heated to their melting point and merge with the molten metal. This method reduces to a minimum the period of oxidation and loss in melting.

● The Charging Device is easily attached to any Cupola.

● **THIS IS KNOWN AS "CROFTS PROCESS" AND IS LICENCED ON ADVANTAGEOUS CONDITIONS.**

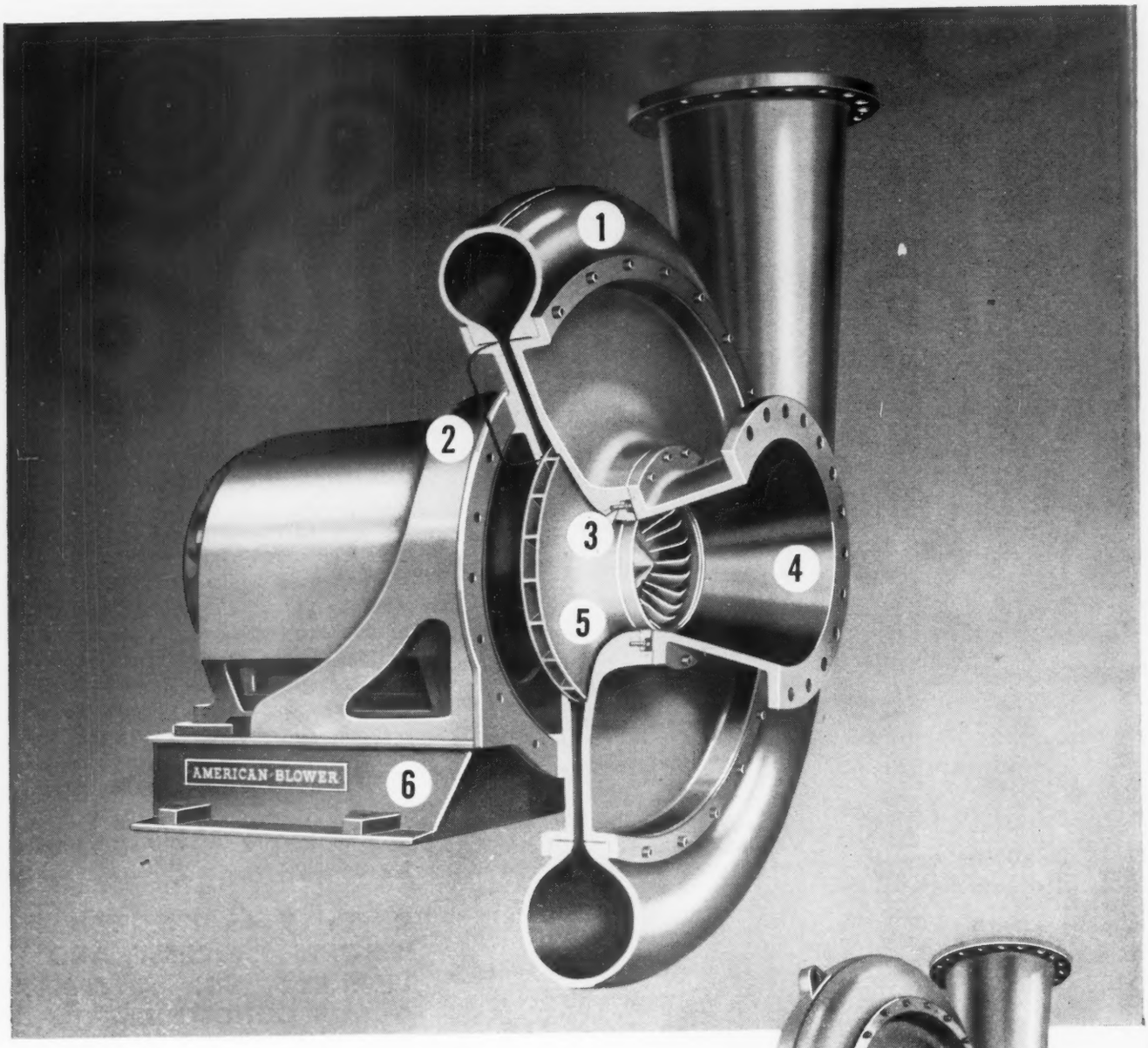
● **Full information can be obtained from the MEEHANITE METAL CORPORATION.**

MEEHANITE METAL CORPORATION

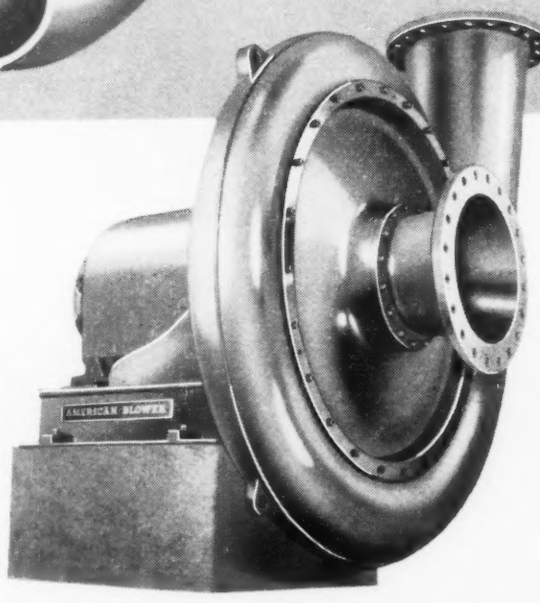
PERSHING BUILDING · NEW ROCHELLE · NEW YORK

TELEPHONE: NEW ROCHELLE 2/3840 CABLE ADDRESS "MEEHANITE"

American Blower...a great



In cutaway view above: (1) Improved scroll-shaped casing design results in increased compressor efficiency. (2) Unobstructed, long diffuser passage converts velocity energy into pressure; provides quiet operation. (3) Annulus packing minimizes recirculation of gas around impeller inlet. (4) Removable inlet nozzle assures accurate alignment of annulus packing when assembled with impeller. (5) Aero-dynamic design of impeller blades results in high efficiencies, long life. (6) Welded steel baseplate is "stress relieved" prior to machining—assuring maintained alignment.



name in air handling, *offers you*

An outstanding line of centrifugal compressors

Single stage design. Sizes from 30 to 600 HP.
Pressures from 1¼ to 3¾ lbs.

If your job calls for delivery of large volumes of air or gases, dependable American Blower Single Stage Centrifugal Compressors are just the ticket.

They're compact, require minimum foundations, are adaptable to all types of drives — electric motor, turbine or engine.

Except for the bearings, no other parts come in contact with each other — holding maintenance to an absolute minimum. Air or gases do not become contaminated since no internal lubrication is required.

Prior to shipment, each American Blower compressor is thoroughly tested in accordance with the A.S.M.E. Power Test Code for Centrifugal Compressors and Exhausters.

If you'd like complete, concise technical data, consult the nearest American Blower Branch Office or write us for Bulletin 109.

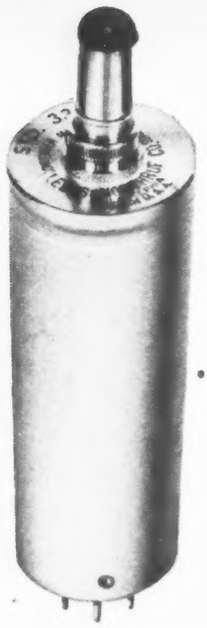
AMERICAN **BLOWER**

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

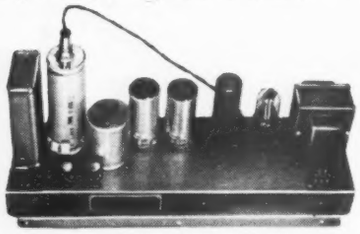
Division of American Radiator & Standard Sanitary corporation

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

A lot of engineering for a Component!



Converter's job in Speedomax instruments is to receive the (often very small) direct current signal which is related to the temperature, stress pH or other condition being measured, and produce an alternating voltage. This output is amplified, and then directs the balancing system to measure, record, and if desired control.



Good engineering shows in this Amplifier's thorough filtering, high impedance, and plug-in connection to the rest of the Speedomax.

Good engineering shows in this Slidewire's non-inductive winding and in absence of any flexible leads which might form inductive loops.

Good engineering shows in this balancing motor's small size, and in its torque ample to operate accessory control and signalling fitments.

and every Speedomax user benefits by it!

• The operating precision of the thousands of Speedomax Recorders and Controllers which serve industry and science begins with the engineering of components like this Converter. Our specifications apply at all stages—all the way back to the plants which make metals, insulation materials, etc., for us. These specs represent also the best thinking of our suppliers' engineers. The resulting materials are thus quality-controlled for us—and us alone.

From these materials our engineers tell our factory how to make converter parts to truly tight specifications. Some parts require principally flatness, or elasticity, or dimensional stability. Reeds need correct natural frequency. Many parts of course combine various needs; each gets its requirements.

Life tests show Fidelity and Stamina. Ingenious and often original design creates from these parts a converter with noise level equivalent to only 0.2 microvolt in an emf potentiometer circuit. And this fidelity promotes accurate measurement and control.

Running on life tests since 1948, present-model converters are today still well inside performance tolerances. Such a run equals 21.9 years of 8-hours-a-day, 200-days-a-year-service—or 1.9 years more than the present age of the first Speedomax.

This kind of engineered performance is also built into the amplifier, slidewire, motor and scores of other exclusively Speedomax parts. It's at your service whether you want to control temperature of steel billets, or record the laboratory studies of steel molecules. Call on L&N application engineers in selecting the exact range (from among thousands) and the exact measuring circuit (from among 2300) to meet your needs. Write our nearest office, or 4917 Stenton Avenue, Philadelphia 44, Pa.

CAREER OPPORTUNITIES AT L&N

Expansion program of this long-established firm has many features to attract outstanding recent graduates in engineering and science. Opportunities are in sales field engineering, product and application engineering, research, advertising, market development. Widely-respected policies assure recognition of progress and achievement. Address Personnel Manager for preliminary interview at nearest of 17 L&N offices.

LEEDS NORTHRUP

instruments • automatic controls • furnaces

Jrl Ad ND46(6c)

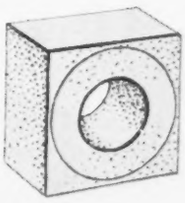
"Here's why I keep a stock of Kaocast on hand!"

The Chief Engineer of a mid-western power plant finds B&W Kaocast so *versatile* that he always keeps a ton or more on hand for miscellaneous jobs. This is only one of hundreds of plants in a list of diversified industries which are discovering practical, time-and-money-saving uses for this unique 3000 degree refractory castable. The panel at right gives a few examples.

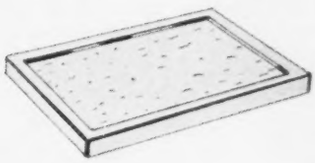
There are good reasons for these Kaocast "success stories". This jack-of-all-refractories can be molded in a hurry *by you, when you need it.* It can be cast directly in place or applied by cement gun. Kaocast not only makes possible faster repairs and eliminates the need for a large inventory of special shapes, but it also stays on the job. That's because Kaocast has high resistance to spalling and slag attack, low volume change and negligible re-heat shrinkage.

Get all the data on easy-to-use, versatile Kaocast from your B&W Field Engineer. His specialized experience is an important B&W "extra".

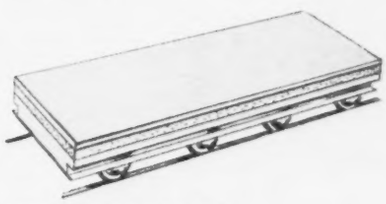
KAOCAST is another important refractories development by B&W engineers who have continuously established new standards in industrial furnace refractories for the past 30 years.



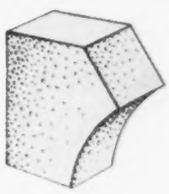
BURNER BLOCKS
Kaocast lasted 3 to 6 times as long as previous refractory. Still going strong.



DOOR LININGS
Kaocast lasted 3 to 6 times as long as previous refractory — cut installation cost in half.



TUNNEL KILN CAR TOPS
Ordinary fireclay crumbled after few trips. Kaocast lasted 30 trips without deterioration.



SPECIAL SHAPES
Kaocast special shapes cast over week-end to meet production demands.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-407

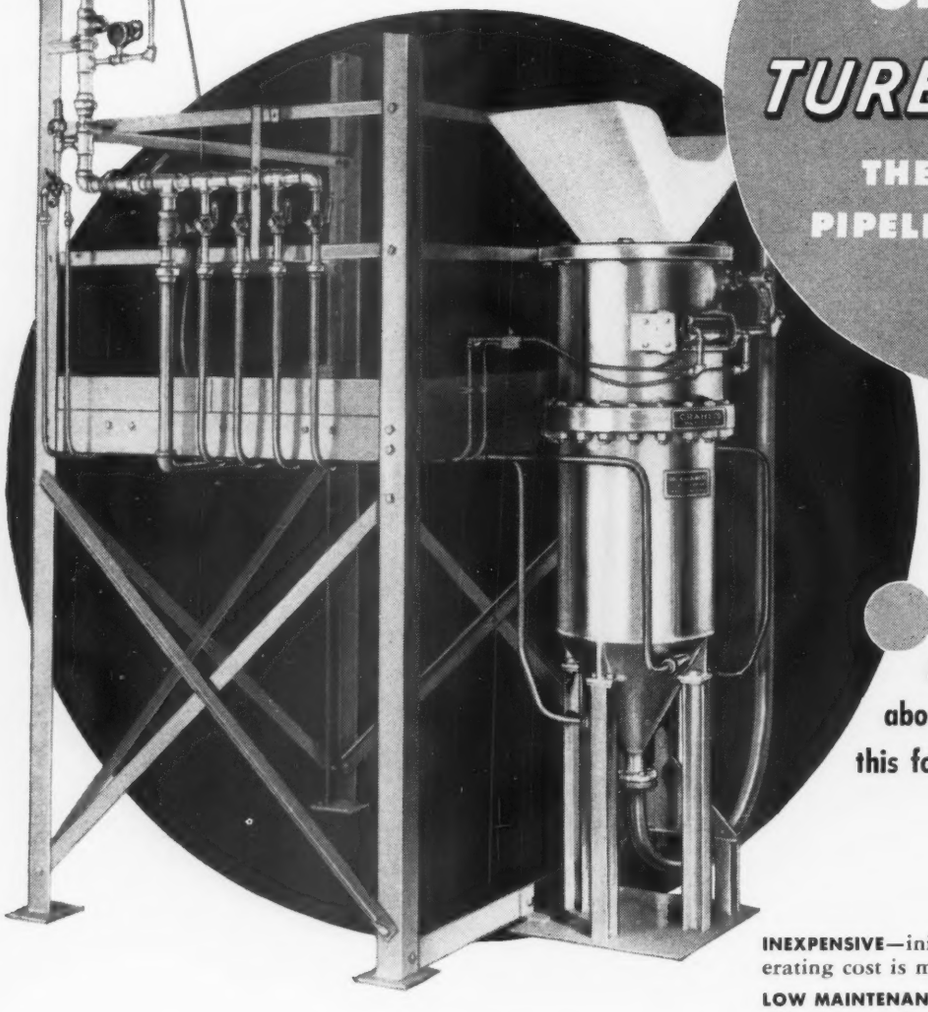
B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment . . . Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

NOW! SAND TRANSPORTING COSTS LESS

...WITH

CRANE TURBO-DRIVE

THE PNEUMATIC PIPELINE CONVEYOR SYSTEM



All the facts about CRANE TURBO-DRIVE are in this folder . . . yours for the asking.

Cost studies made on installation after installation prove that the Crane *Turbo-Drive* reduces to a minimum the cost of transporting sand in batches.

It's economical to install and operate because the pipe and switches can be run anywhere. Vertical or horizontal runs, angle turns—walls and other obstacles are no problem. If you are modernizing your present foundry or building a new one, it will pay you to check into this modern, economical sand conveyor. For further information and engineering service, write to Crane Co. at the address below.

INEXPENSIVE—initial installation cost is low, and operating cost is more economical than other methods.

LOW MAINTENANCE—simplicity of design and dependable construction reduce maintenance to a minimum.

SAVES MAN-HOURS—entire system is controlled by a single operator.

SPEEDS DELIVERY—transports material to desired location in a few seconds.

SAVES SPACE—installation requires minimum floor space.

BATCH DELIVERY—each batch delivered complete.

CLEAN—NO DUST—material fully enclosed and protected at all times. Mixed materials are not affected in transit.

SAFE—all working parts are pressure designed. Material moves safely in steel pipe.

CRANE CO.

General Offices:
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

PERFECT SURFACE IS A "MUST". . .

Large drying rolls, like the one below receiving its final polishing pass, are used in "Yankee Dryer" paper-making machines which turn out soft facial tissue. Even slight surface flaws in these eight- and twelve-foot diameter castings cause them to be rejected.

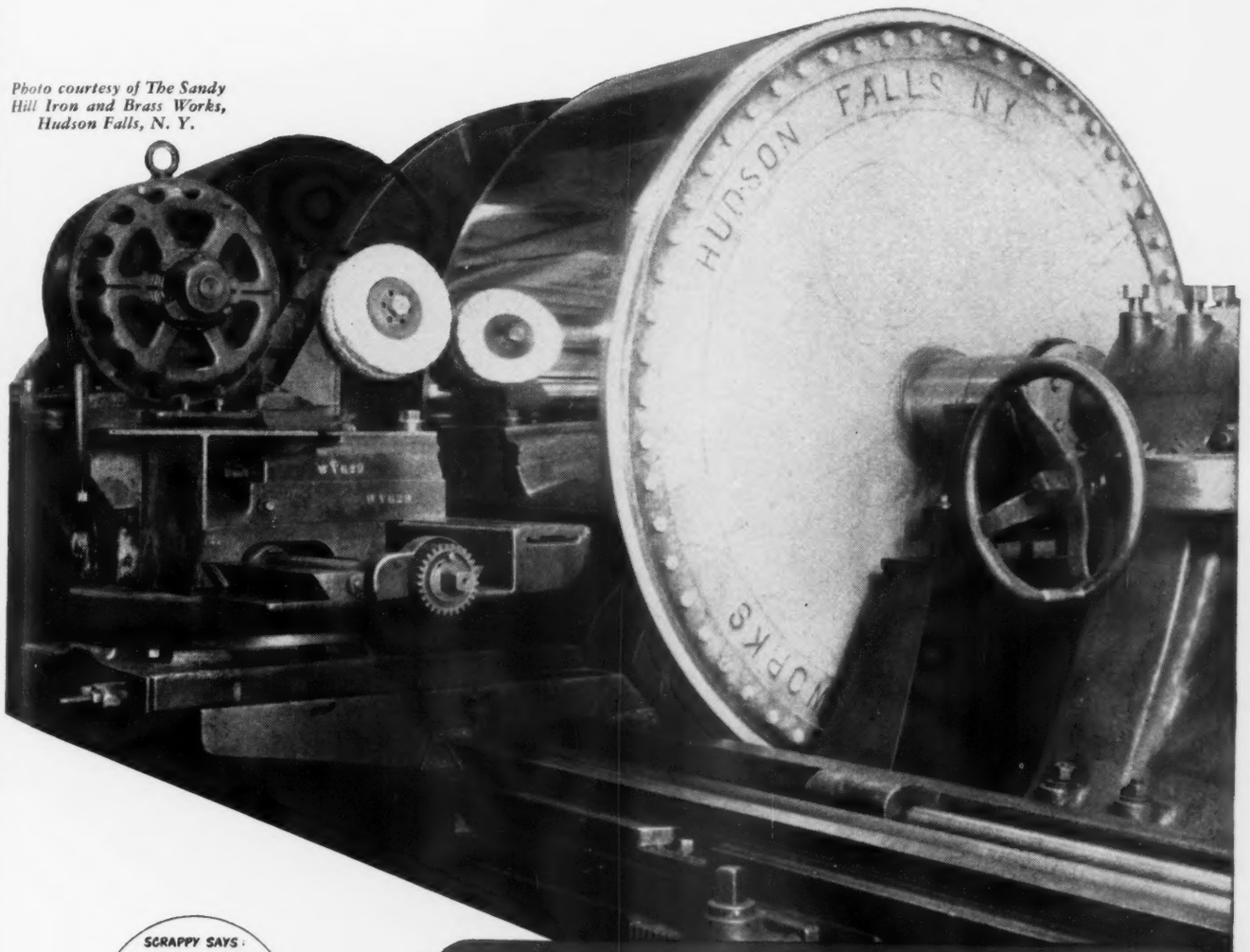
So they use CHATEAUGAY PIG IRON

. . . the low-phosphorus, copper-free pig iron that has eliminated scrap losses in countless "tough casting" jobs. With CHATEAUGAY, consistently uniform "physicals" assure predetermined fine grain structure throughout every casting, regardless of size or shape.

Whatever the requirements of your castings—if ordinary pig iron won't do the job—NOW is the time to investigate the *exclusive* advantages of premium CHATEAUGAY. A Republic Pig Iron Metallurgist will be glad to give you the complete facts at your convenience. Write today to:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Photo courtesy of The Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.



Republic PIG IRON

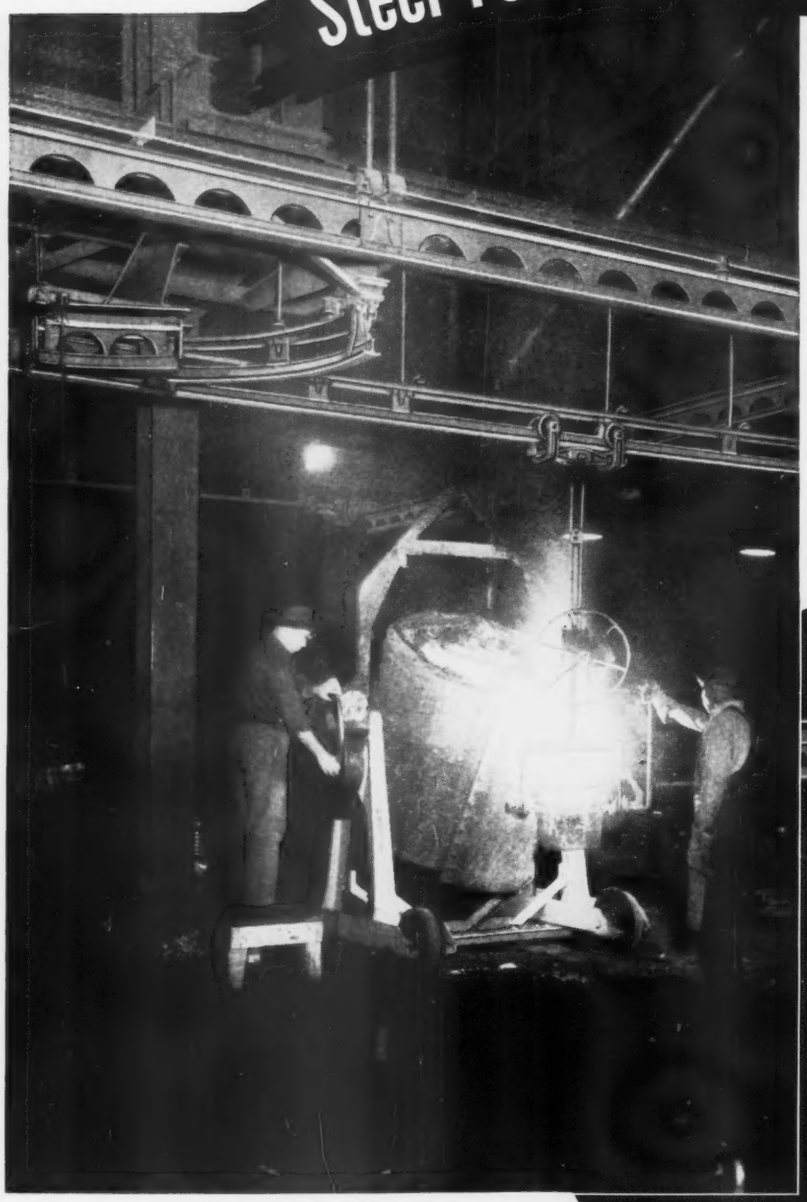
"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

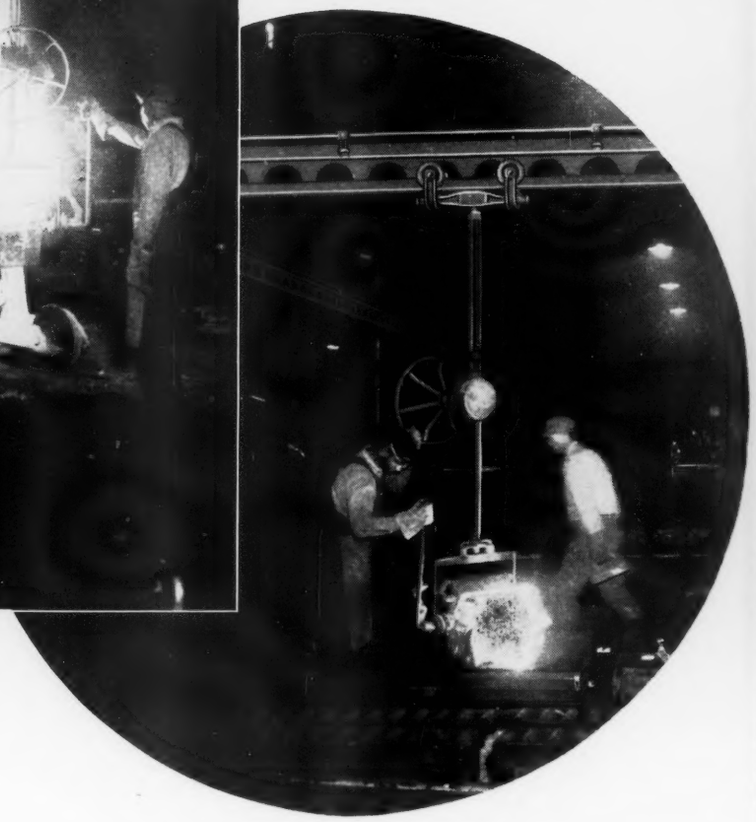
Steel Foundry *Cuts Production Costs*



Not only has Cleveland Tramrail been an important factor in speeding production and lowering costs in a large Michigan steel foundry, but it has eased the work for the employees and aided their safety.

Because of the gratifying experience with the original equipment installed in 1936, more has been purchased every ensuing year. Today Cleveland Tramrail equipment provides handling coverage for the entire pouring floor, the large cleaning department, and will be found in every section of the plant.

This progressive foundry (name on request) is fully convinced of the many advantages that can be secured with Cleveland Tramrail equipment.



In nearly every instance, each of the many installations of Cleveland Tramrail at this foundry, paid for itself within the first six months of operation.

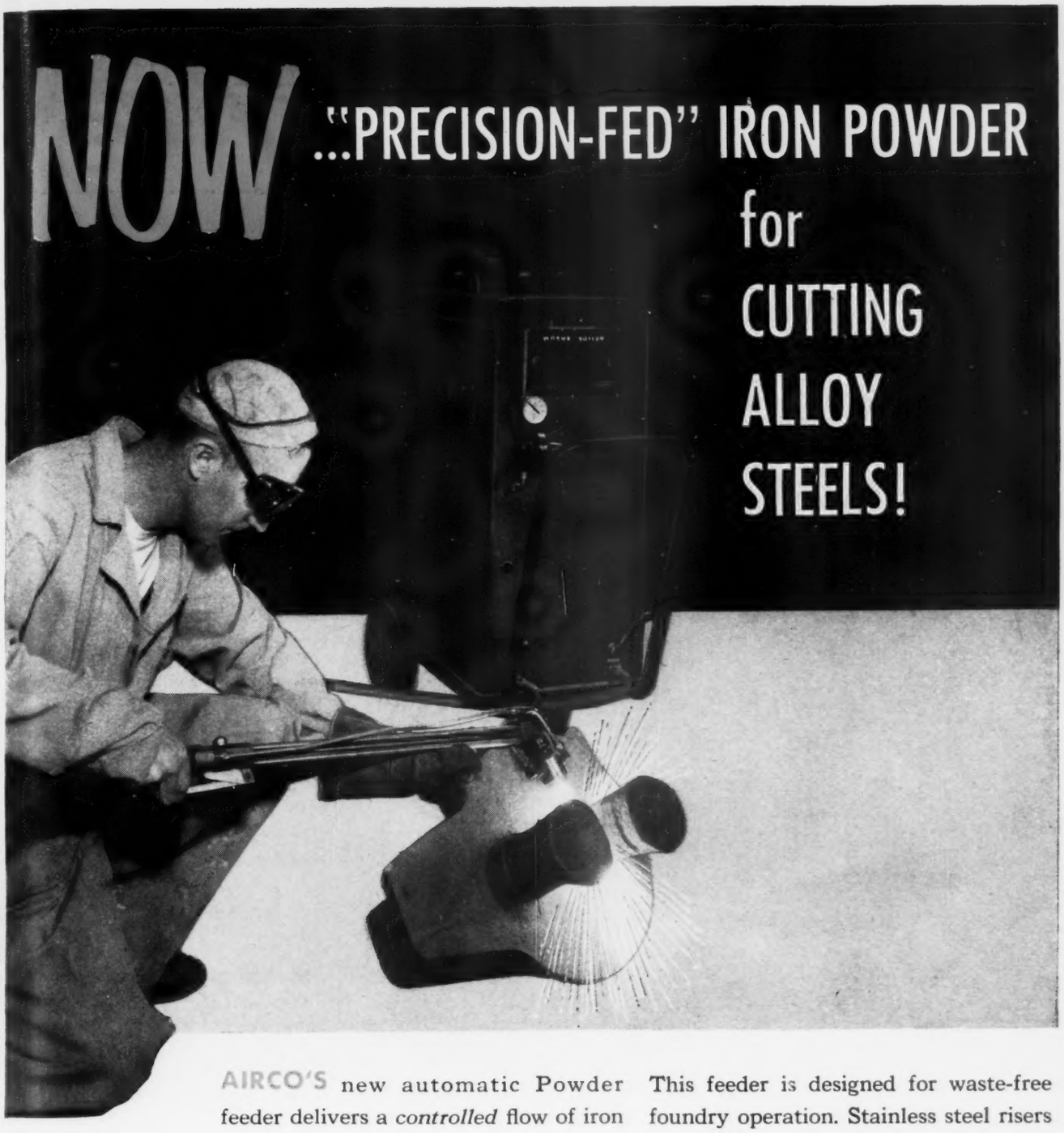
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3805 EAST 286th STREET *WICKLIFFE, OHIO*

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

NOW ...PRECISION-FED" IRON POWDER for CUTTING ALLOY STEELS!



AIRCO'S new automatic Powder feeder delivers a *controlled* flow of iron powder . . . for any size section or any type of high-alloy ferrous metal. Set the dial for your exact requirements — whether the job requires a pinch or a pound of powder!

This feeder is designed for waste-free foundry operation. Stainless steel risers can be removed with minimum powder consumption — thanks to calibrated electrical control. And the Airco portable feeder is readily adapted to manual or machine cutting units!

AIRCO

DEALERS AND OFFICES IN MANY PRINCIPAL CITIES

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY • AIR REDUCTION PACIFIC COMPANY

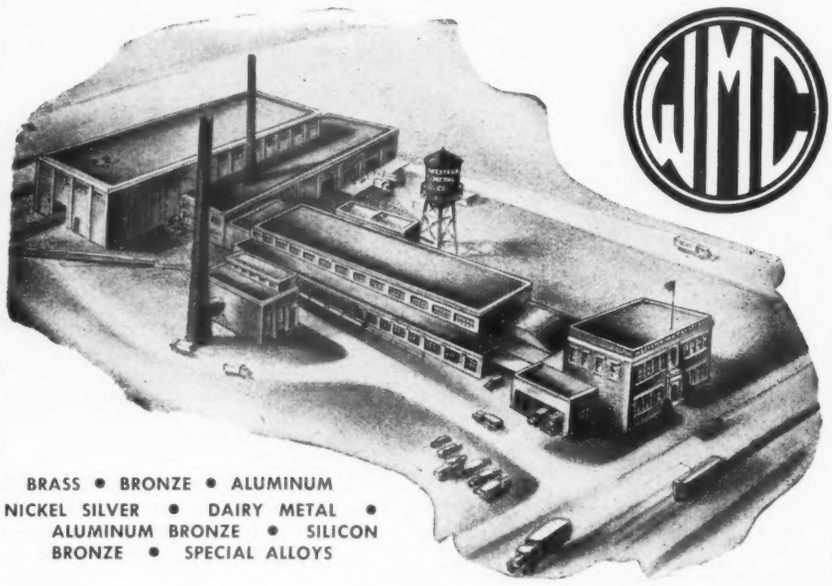
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED

at the frontiers of progress you'll find AN AIR REDUCTION PRODUCT

Quality

INGOT METALS



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SMELTERS AND REFINERS OF BRASS AND ALUMINUM INGOTS

Readers' COMMENT

An Industry Grows

TO THE EDITORS:

It is with a great deal of interest that we note that your September issue marks 60 years of service to the foundry industry. Frankly, we feel that "service" in the broadest sense does not describe adequately what you have done for the industry and for individuals.

The writer has never been accused of having any book learning, inasmuch as I never completed a formal education and started working as a laborer in a foundry more years ago than I care to recall. Any book knowledge that I might have accumulated regarding the foundry industry has been accumulated through faithfully reading FOUNDRY.

The tremendous growth and improvement of equipment throughout the foundry industry could only be accomplished by the circulation of the wealth of information that can be had in any issue of FOUNDRY.

The writer and my entire staff wish to extend to you heartiest congratulations on the 60th anniversary.

WILLIAM A. MEISSNER JR.
Chief, Foundry Branch
Copper Division
NPA, Washington

* * *

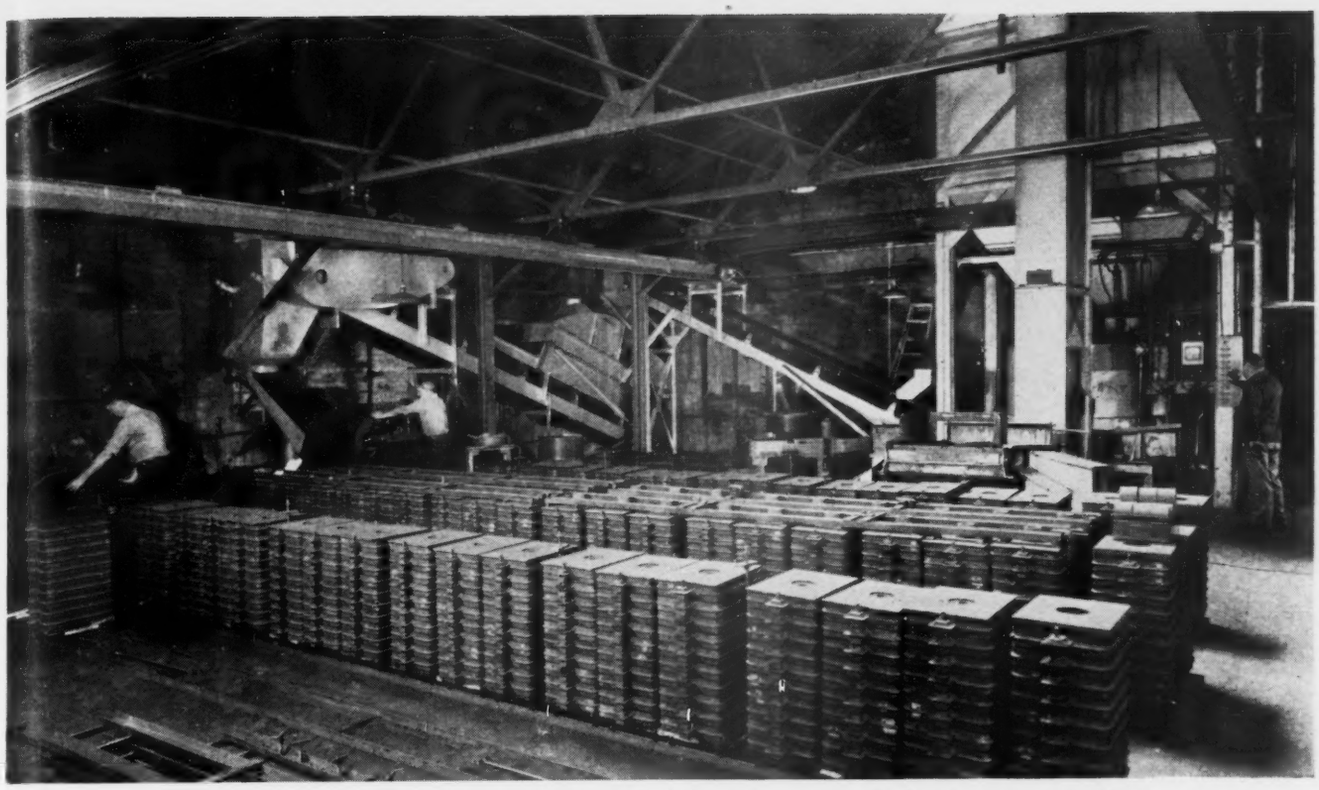
Better Informed Foundrymen

While a student in the foundry program at Northwestern University I received twelve issues of your fine magazine with your compliments. I read each issue with much interest and derived a great deal of educational value. Currently the magazine is important as an index to the pulse of the foundry industry.

Recently I graduated from Northwestern and have taken a job as foundry engineer with National Malleable & Steel Castings Co. I have come to realize the value of FOUNDRY in the capacities listed above.

I would just like to add my appreciation of your interest in the foundry training program sponsored by the Foundry Educational Foundation. I know it will pay dividends to you in the way of increased reader interest and to the foundry industry in general in the way of better informed foundrymen.

ROBERT A. CECH
Cicero, Ill.



Link-Belt equipment at Cutler-Hammer foundry includes shakeout screen, bucket elevator, storage bin with vibrating screen (right); transfer belt conveyor, Revivifier and distributing belt conveyor (left).

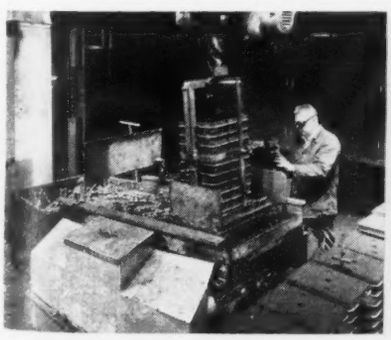
LINK-BELT mechanization pays dividends for foundries of all sizes

Here's how one important foundry gets fast, clean, low-cost handling of sand and castings

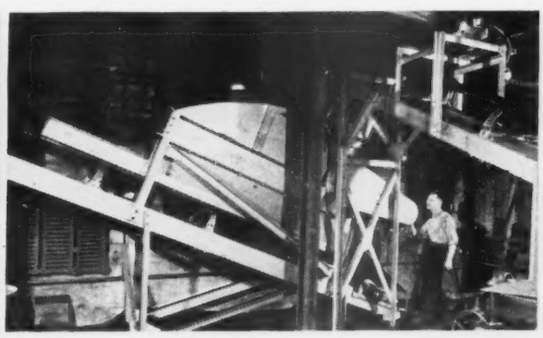
WHETHER your foundry is large or small, mechanized handling of sand and castings offers two big advantages. First, you can produce better castings at lower cost. Equally important, you can make more efficient use of scarce manpower . . . eliminate much backbreak, improve working conditions.

For instance, consider Cutler-Hammer, Inc., Milwaukee. Their new Link-Belt-designed system prepares 15 tons of sand per hour for two stack molding machines. Careful planning has speeded production, provides good housekeeping. Central shakeout simplifies handling and sorting of castings. Despite low headroom, alterations were minor. And provision has been made for expansion.

For information on how mechanization can serve you, call the Link-Belt office near you. A Link-Belt foundry specialist will welcome the opportunity to work with you or your consultant.



Link-Belt Shakeout gives positive separation of sand and castings.



Ram-offs are minimized because sand is thoroughly aerated for easy flowing by Link-Belt Revivifier.

LINK-BELT

Conveyors and Preparation Machinery

●

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,736

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

Veterans on the Production Front!

Sterling Style ⅜ ND-RT Special Flask showing cylinder block mold before cope was placed in position for pouring.

In Service 10 Years And Still Going Strong

The Sterling Heavy Duty Rolled Steel Flasks, shown above, have been producing cylinder block castings for Diesel engines in a Mid-west foundry for more than 10 years. And they are still going strong.

Sterling is the original and only ROLLED STEEL CHANNEL foundry flask. The heavy flanges with square corners and full-width bearing and the solid reinforcing bar around each section provide strength and rigidity to withstand tremendous pressures, year after year. Partings are accurately machined — not just surface ground, but planed to an accuracy of .005". The thick flanges have plenty of steel for several refinishings.

More than 4,500 foundries in America use Sterling Flasks . . . and every flask proves the Sterling ability to stand up, year after year, under rough foundry usage. Write for your copy of Foundry Equipment Catalog.

STERLING WHEELBARROW COMPANY, Milwaukee 14, Wis., U. S. A.

The name Sterling, in connection with foundry flasks, is universally recognized as the symbol of quality, the very best that money can buy.

Sterling

Pioneers in the Manufacture of Foundry Flasks

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What About the Future?

CONSENSUS of business leaders and economists is that the 1950's will see a substantial increase in sales of goods and services. By 1960 production of metals and those items manufactured largely from metals is expected to be more than 45 per cent larger than in 1950. Output increased about 100 per cent between 1930 and 1940.

Business forecasting still is hardly an exact science, but in this case there is at least one solid fact on which to base expectations of an expanding economy. That fact is the continued upward trend in population—and therefore a growing number of potential consumers of all kinds of products. Bureau of the Census thinks that by 1960 our population will be approximately 17 million more than it is today, 37 million more than in 1940.

Obviously, if this new and larger market is to be translated fully into rising demand for the products of foundries, mills and factories, the paralyzing effects of war or runaway inflation must be avoided. In addition, the restrictive influence of taxation's onerous burden will have to be corrected. But let's assume that conditions permit the business expansion forecast to be realized. What are the prospects for foundries to maintain or increase their present share of the total metalworking market?

Several factors enhance the foundry outlook. These are in addition to the inherent advantage of the casting process in being the shortest path in so many cases between the blueprint and the actual part. Even this advantage will be impaired unless constant efforts are made to improve both the properties and quality uniformity of castings. Such efforts are evidenced in the growing emphasis on quality control, research, and what might be termed the engineering approach to casting operations. Typifying the last-named is the rising influx of engineers into the ranks of foundry personnel, stimulated by activities of the Foundry Educational Foundation.

New or improved materials and processes, including nodular iron and shell molding, have potentials that could markedly increase future uses for castings. More efficient foundry equipment and its broader application likewise are supporting factors in the competition with other fabricating processes. The strong surge toward modernization and mechanization since the war already is reflected in gains ranging up to 20 per cent in foundry worker productivity, according to government statistics.

Measured in terms of the more than $5 billion worth of products it shipped last year, the foundry industry is big business. It has the means, if it will apply them, of becoming both bigger and stronger in the years ahead.

William G. Gude

Managing Editor

PATTERNMAKING....*Today*

By M. J. KELLNER
Superintendent
Trafford Foundry
Westinghouse Electric Corp.
Trafford, Pa.

WITH the extension of mass production methods to the foundry, an entirely new concept of patternmaking has come to the pattern shop. Patterns today must be rugged and accurate to withstand the abuse imposed by mass production methods and at the same time produce castings that will fit the jigs, fixtures and automatic lathes of the machine shop.

First of all, the factors involved in the planning of patterns have become increasingly complex. The area of the casting, the material from which it is to be made, and the thickness must be considered and integrated with the considerations of the activity of the pattern and core boxes, the number of cores required and the type of parting job to be used. Often, the actual design of the casting further complicates the planning.

When each of these factors has been determined for the job in question, it becomes one of the points which help to decide what type of equipment is to be built. For example, the size of the job may warrant that the mold be made in a small flask, but when the activity information is considered, it might prove more economical to produce the casting in multiples in a larger flask. Still further, it might happen that the number of cores required would prohibit the use of the next larger flask because of a slowdown of the molding unit and a consequent breaking of its cycle. In this case, the pattern would have to be built for an even larger flask which would allow a longer core setting time without interrupting the machine cycle. Thus, after due consideration, the type of equipment to be made is finally decided upon.

Fig. 2—Welding, comparatively new to patternmcking, is invaluable in the large-scale production of patterns. Without welding, this pattern would require rather extensive machining

More often, the strict durability requirements of mass production foundry equipment insists that the equipment be made of metal. A variety of metals can be employed for patternmaking. White metal, cast iron, steel, brass, magnesium and aluminum have all been used successfully. However, the harder metals like steel and cast iron do not stand the action of the high speed sandslinger overly well, and although brass does, it is very difficult to work. White metal is too soft and becomes cumbersomely heavy when used for large castings. Magnesium, though having none of the preceding inadequacies, presents problems in that it must be separated from the melting department. Consequently, aluminum has been widely used for metal patternmaking since it is light, tough, and easily machined.

Frequently parts which require irregular partings need a special matchplate; furthermore, when these parts are production items, the activity of the matchplate is very high. The double matchplate is especially suited for this job in that it is actually two plates, one of which has the cope impression and the other the drag impression of a single job. To circumvent the activity difficulty, it is mounted on cope and drag molding machines, the mounting equipment being cast as an integral part of the matchplate. Segmented flask equipment is most frequently employed in making multiple impression matchplates from a single master pattern.

Making of master patterns for thin cross-section castings is a difficult job because of the danger of distortion. Usually a correspondingly thin wood pattern is built; distortion of the cope and drag equipment is minimized by making the inside and outside shapes separately. To make a metal pattern from these separate pieces and still keep the weight at a minimum, the pattern molder must be trained in a system of false coping. This system consists of making the outside and inside of the respective pieces, in the sand of the molding floor, as shown in Fig. 3, by shaving (*Please turn to page* 203)

An Equipment Manufacturer Discusses

Air Pollution Ordinances

The author points out that it's not always the visible escapement from industrial plants that causes the major problem in air pollution control. This paper was presented before the annual meeting of the Air Pollution and Smoke Prevention Association of America at Cleveland, June 10, 1952

By JOHN M. KANE
Manager, Dust Control Division
American Air Filter Co., Louisville

WE MAY logically ask why stacks from foundry melting equipment often have been the target of air pollution control attention when this criticism frequently applies to stacks equipped with air cleaning equipment as well as to those without any control devices. This is especially disconcerting when we realize that the foundry industry was air pollution conscious for years before the subject made front-page news.

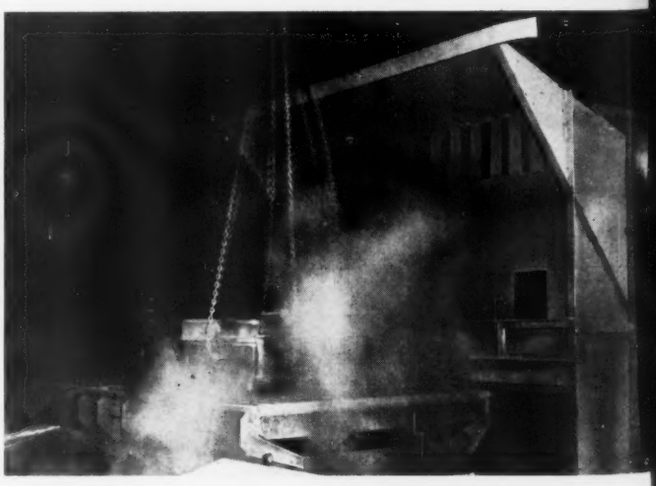
The industry has been an outstanding example of a good neighbor through the continual use of high-efficiency dust collecting devices for its many dust producing operations. Foundry industry expenditures for air pollution control equipment for many years have run better than 10 per cent of those for all new foundry equipment purchased. Although size of operations does vary widely, many ferrous foundries would have control equipment of the following order:

Shakeout—A vibrating screen separates hot castings from the sand used to form the impression in the mold. Fine dust, smoke, steam, and gases are released during the operation. Shakeout sizes range from 3 x 5 ft to 16 x 20 ft and occasionally larger. Usual range and numbers involve exhaust of 15,000 to 30,000 cfm. Operation is normally for one full shift.

If enclosing type of exhaust hoods is used, concentrations will range from 1 to 3 grains per cu ft with mean particles size of 1.5 to 3 microns. With side exhaust type of hoods (used on larger shakeout sizes), concentrations could be from 0.5 to 1.0 grains per cu ft with mean particle size of 0.7 to 1.5 microns. Wet type dust collection is normally selected because of the particle size and the presence of higher temperatures and steam.

Collection efficiencies of 97 per cent or better for enclosing type of hoods, and 90 per cent or better for side exhaust hoods, are readily obtained, reducing concentrations in effluent air to some 0.05 to 0.10 grains. Such control used in most foundries having mechanical shakeouts removes from 100 to 700 lb of dust per hour that would otherwise be discharged with the exhaust gases from the shakeout operations described.

Sand System—The sand falling through the shakeout grate is conveyed to the sand preparation equipment, where it is conditioned for reuse. Sand systems are typical material handling systems of conveyors, elevators, screens, bins, and mixers and often have a capacity of 10 to 30 tons per hour. Operation is for a full shift. Local exhaust ventilation at the dust and steam producing points is some 6000 to 10,000 cfm, containing from 3 to 6 grains of dust per cu ft of air with a mean particle size of 3 to 10 microns. Wet dust collectors reduce effluent concentrations by 97 per cent or better, leaving not more than 0.2 grains per cu ft with mean particle size of 3 microns or less. Pounds per hour removed are some 150 to 500 lb that



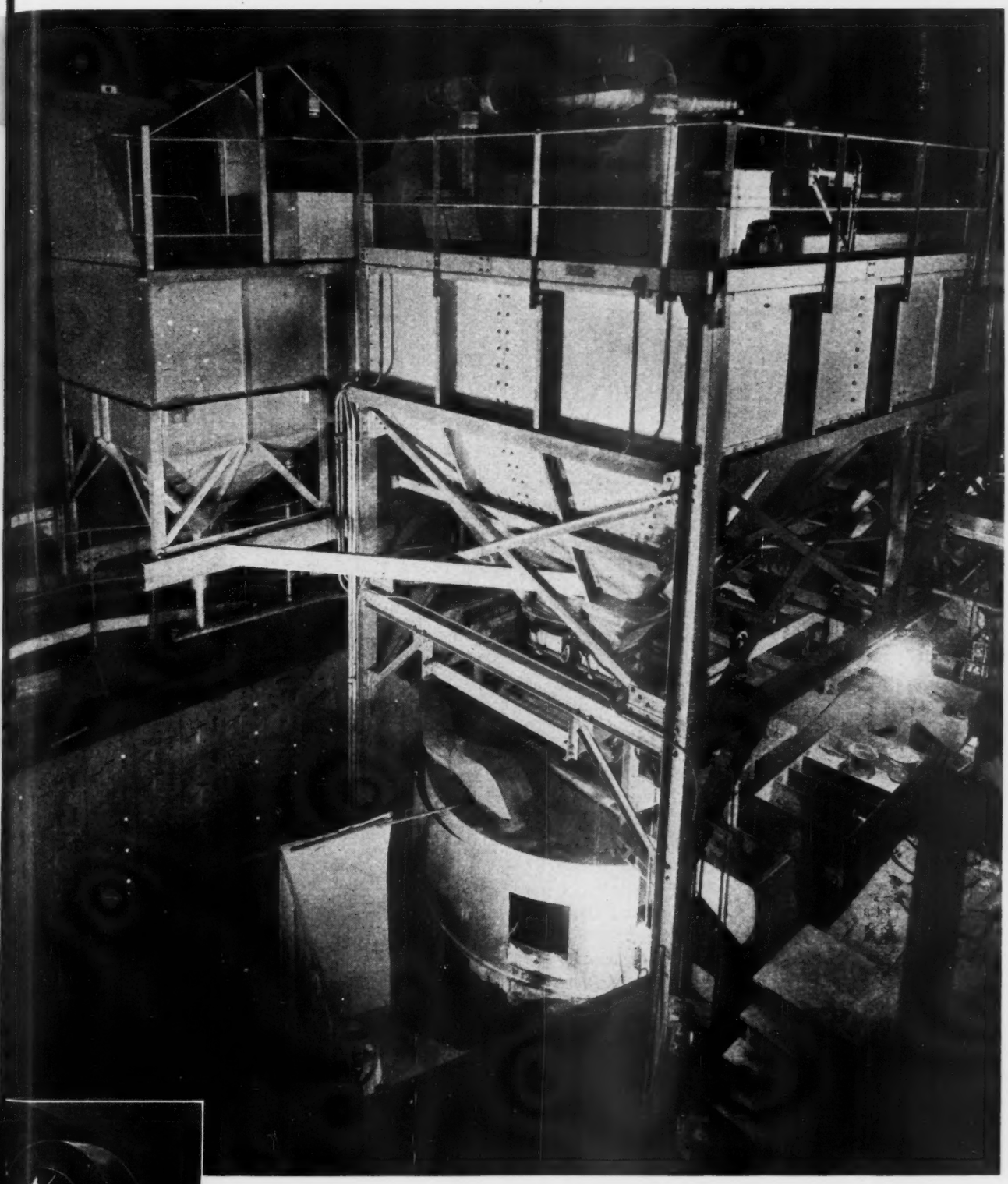


Fig. 1 (above)—Dust is produced in the material handling of shakeout sand through conveyors, elevators, screens, bins and mixers. This wet type of dust collector, installed on the exhaust system, provides proper ventilation for bins and mixers

Fig. 2 (left)—Fine dust is released when castings are removed from hot sand. Use of collection equipment is standard where central vibrator shakeout units are used

Fig. 3 — Swing frame grinder in the steel foundry releases concentrations of fine, metallic dust. Collection of it keeps plant clean and prevents scattering of dust in plant area

otherwise would be discharged to the atmosphere.

Abrasive Cleaning—Burned sand and/or scale is removed from the casting surfaces in the cleaning room. For an average foundry, the equipment might consist of a grit blast room and an airless blast unit. From the grit blast, an exhaust volume of 10,000 cfm might be required, containing some 6 grains per cu ft of dust with mean particle size of 10 microns. For the airless blast, we can assume 3000 cfm with loadings of 15 grains and 20 microns mean particle size. Fabric collectors or wet type collectors reduce these figures to not more than 0.02 grains per cubic foot with mean particle size not greater than 0.7 microns, thereby removing some 800 lb per hour that would otherwise be discharged to the atmosphere.

Metal Grinding—Castings are usually finished on two-wheel grinding stands where metallic dusts are removed. If we assume three stands with six 24-in.-diam wheels, exhaust volume of 3000 cfm is probable with a dust loading of 0.5 grains and 50 microns mean particle size. With low concentration and large particle size involved, dry centrifugal type dust collectors are popular, reducing the effluent concentration to 0.002 grains per cu ft and mean particle size of 5 microns. Dust collectors remove 15 lb per hour of cast iron, malleable iron or steel dust that otherwise would be discharged to the neighborhood atmosphere.

Melting—In the usual ferrous foundry, melting is done in the cupolas for malleable and gray iron and in the electric furnace for steel.

(a) *Cupola.* Cupola melting rates range from 1 to 30 tons per hour, and most foundries have one or two cupolas in operation at any one time. In many smaller foundries, iron may be melted for from only two to four hours during the working day. Stack gas volumes are some 3000 cfm per ton of metal melted per hour, with stack temperatures ranging from 900 to 1500° F. Dust loadings vary considerably and so does mean particle size. Probable range is from 0.5 grains with mean particle size of 0.6 microns, to 2.0 grains per cu ft of standard air (0.3 to 1.1 grains based on 500° F air, used as a base in many ordinances.)

Lighter loadings consist basically of metallic fumes, and heavier concentrations include coarse particles or charged materials picked up by the stack gases. Wet type collectors were purchased at considerable investment by many foundries when it was demonstrated that large quantities of the solids could be removed. While data is difficult to obtain, due to the problem of sampling effluent air from such collectors mounted on top of the cupola, it appears that the collectors reduce the effluent concentration to some 0.2 grains per cu ft of standard air or 0.1 grains with gas temperature corrected to 500° F, removing from 6 to 30 lb per ton of metal melted.

(b) *Electric Melting Furnaces.* Electric furnaces

Air Pollution Control in a Typical Foundry

Operation	Standard Air, cfm	Pounds per Hour — Collected	Pounds per Hour — Discharged	Effluent Air — Gr/cu ft Standard Air	Effluent Air — Gr/cu ft Corrected to 500° F	Approximate Equipment Cost Per cfm Standard Air	Approximate Equipment Cost In 1952 Dollars
Shakeout	15,000–30,000	100– 700	10–25	0.05 –0.10	0.03 –0.06	$.25–$.40	$4,000–$12,000
Sand system	6,000–10,000	150– 500	5–15	0.1 –0.2	0.06 –0.12	.35– .50	2,000– 5,000
Grit blast room	10,000–	200– 500	2– 5	0.005–0.1	0.003–0.06	.35– .50	3,000– 5,000
Airless blast	3,000–	200– 300	2– 3	0.05 –0.2	0.03 –0.12	.40– .60	1,000– 2,000
Grinding wheels	3,000–	10– 15	0.5– 1	0.002–0.1	0.001–0.06	.15– .25	500– 1,000
TOTALS	37,000–56,000	660–2015	19.5–49				$10,500–$25,000
Add							
Cupola (5T/hr)*	7,500	30– 150	15	0.2 –0.4	0.12 –0.22	$.75–$1.50	$10,000–$20,000
Or Add							
Electric furnace (5T/hr)*	15,000	12– 30	8.0	0.05 –0.1	0.03 –0.06	$.35–$ .50	$5,000–$ 7,500

*The control equipment considered for this melting unit will not greatly alter the discharge appearance of the stacks.

in the steel foundry have melting rates from 1 to 25 tons per hour and release metallic fumes and smokes with mean particle size of about 0.4 microns. Exhaust of the fumes from the melting room was done for years by general ventilation through roof monitors or power-driven ventilators. Exhaust volume for a furnace melting 5 tons per hour would be some 100,000 cfm, and the metallic fume released would be some 20 to 40 lb per hour or about 0.03 grains per cu ft of standard air. With the small particle size and large exhaust volume collection, equipment costs would be prohibitive for the average foundry.

For better and more consistent removal of the fumes from the building, many steel foundries installed local exhaust hoods on the furnace roof ring to concentrate the fume in some 15 per cent of the exhaust air used in general ventilation methods. By so doing, they increased effluent concentration from 0.03 to 0.20 grains for the 5-ton melting rate *although the pounds of fumes released to the atmosphere per hour remained the same.* With such local hoods, many foundries added wet collection equipment to remove 60 to 80 per cent of the solids, thereby collecting 2 to 6 lb per hour per ton melted and reducing stack effluent to 2 lb per hour per ton.

Data for a typical foundry based on the above discussion has been consolidated in the accompanying table, together with a rough approximation of equipment cost. Cost estimate does not include erection, duct connection, foundations, electrical wiring and water connection; therefore, costs to the foundry could easily be twice those estimated. Consequently, at an expenditure of from $10,000 to $25,000, our typical foundry has prevented the escape of some 600 to 2000 lb per hour of nuisance-causing dust. From many operations, no visible escape would be noted if control equipment had not been installed.

With melting equipment, the problem differs. Control equipment for coarse particle removal is expensive (roughly the cost for all other dust producing operations) and does not greatly alter discharge appearance. To provide still more expensive equipment to collect a few pounds of fume particles to reduce visible appearance is hard to justify.

The expenditure by this hypothetical foundry for air pollution control equipment is certainly substantial. Of even greater significance is the realization that, with the exception of the melting units, the use of air pollution control equipment has been standard practice with most foundries for many years. Demand for such equipment probably prompted the development of the fabric collector since it can be noted that many of the major manufacturers of such collectors are foundry equipment manufacturers.

Likewise the foundry industry gave impetus to wet dust collector development with the advent of mechanical shakeout and sand conditioning systems. In each case, air pollution control equipment had been purchased with an effort to obtain most effective control possible at reasonable cost and reasonable maintenance. In so doing, concentrations were reduced substantially below the grain loadings permitted in those cities that adopted the ASME type of code for fly ash from boilers and extended it to include other industrial effluents.

Against such a background, the confusion caused by the arbitrary shifting from weight to visible standards by many air pollution regulating bodies should be easy to understand. To remove the few extra pounds of solids per hour necessary to eliminate substantially visible escapement from the (*Please turn to page* 204)

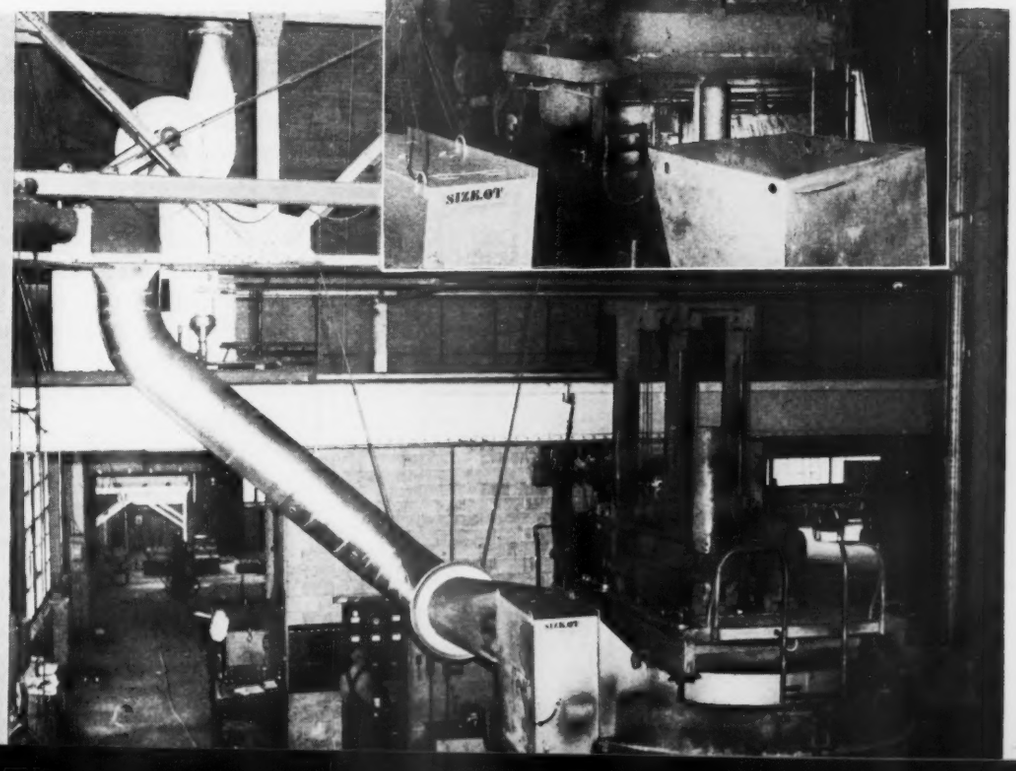


Fig. 4 — Application of local exhaust ventilation on electric melting furnaces in steel foundry makes the installation of collection equipment for the metallic fumes practical. Insert shows fumes released prior to the installation of such an exhaust system

What Causes M

By CLYDE A. SANDERS
Vice President
American Colloid Co., Chicago

FOR years foundrymen have wondered about and investigated the reasons why some naturally bonded sands are "stronger" than other similary deposited, naturally bonded sands. Likewise, they have wondered why some clays are "stronger" than other, similar clays.

It is always wise when one is confronted with such a problem or investigation to go to other industries and to learn from them what they have found in their investigations of a similar problem. For this reason, we suggest to those who are interested in the subject that they review some of the fundamental findings of the ceramic industry.

The ceramic industry is interested primarily in the function of all clays. From many investigations of the functions of various clays, the ceramic industry has collected many data which are also quite important to the foundryman. For this reason, certain theories which this ancient industry has considered and recognized are presented here to the foundryman.

Chinese History—In years past the Chinese recognized the value of aging clay. The son worked the clay that was prepared by his grandfather, and he in turn prepared clay during his lifetime for his grandson. When a clay deposit was located a Chinese worker mined the clay, spread it on the ground, covered it with grass or grass mats, spread over the grass another layer of clay and then wet with water the layers of clay and grass. He continued to add wet layers of clay and grass throughout his lifetime while he used and worked his grandfather's clay, which had been prepared in the same manner two generations before him. Today, this custom can still be traced to certain Chinese bands. Clays prepared in this manner are quite plastic, thereby indicating that aging, water, humus matter and other physical factors are important in the development of plasticity.

It is common to find foundry daubing clays soaked in pits overnight in water, so the ancient Chinese custom hasn't been entirely forsaken.

Molding Green Strength?

To foundrymen eager to solve sand problems, particularly those involving green strength, the author suggests that the ceramic industry's theories about causes of clay plasticity can be of help

Many foundries have found that mulled, tempered molding sands left standing in storage trucks overnight with a damp burlap cover have better or improved green compression strength. Aging not only increases strength, but also equalizes water content.

What Plasticity Is—Foundry nomenclature uses such terminology as "green compression strength," "tensile strength," "green shear strength" and other, less common terms, but it does not include expressions to describe the plastic property of sands. Plasticity is directly related to strength in all "green forms."

Wilson[1] and Bancroft[2] both describe plasticity as "that property which enables a material to be deformed continuously and permanently without rupture during the application of force which exceeds the yield value of the material."

Metals are sometimes described as being plastic to a certain extent because they deform under pressure and hold their new shape when the pressure is removed. However, metals lack the ability, under certain conditions, to reunite after they have been broken apart. The ability to reunite is an essential property in molding.

Clays are heterogeneous mixtures and derive properties not only from their content, but also from the size of the content, their ability to absorb and their position in their natural deposit. Ries[3] has furnished much data on the origin, occurrence and properties of many clay deposits.

Plasticity is the most important property of clay minerals and the one least understood. The ceramic definition is in dispute, but most ceramic engineers define it as "that property by virtue of which a mass may be 'molded' into shape when lubricated with water and then retain its shape when the lubricant has been removed." This definition fits into the nomenclature of foundrymen.

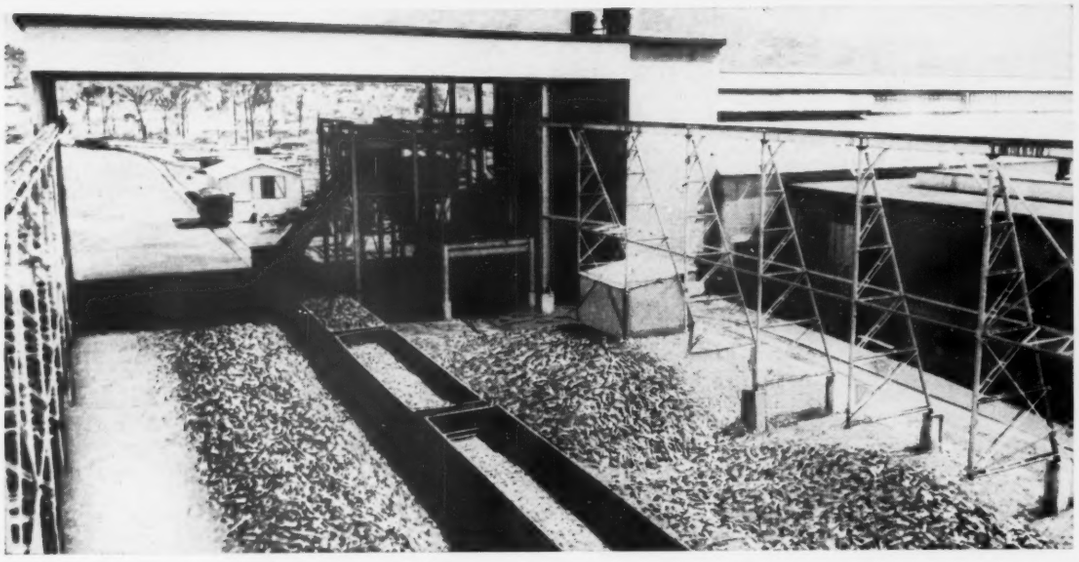
The word "molded" implies the application of pressure. Theories about plasticity are numerous and very different. No one theory explains satisfactorily the plasticity of all clay masses. "Plasticity" and "mobility" are not synonymous terms. "Mobility" implies the movement under pressure of mass particles without the aid of any lubricant. There must be a lubricant before a mass can be plastic. For true plasticity in clay, ceramic engineering assumes that the lubricant is water. If a greasy substance is added to a clay material that is supposed to be plastic, the plasticity is decreased.

When some ceramic engineers have difficulty developing plasticity in certain clays, they add glycerine to the extent of 4 per cent to water and heat the solution to boiling in order to bond the water and glycerine together. This solution may then be added to clay bodies to promote better plasticity.

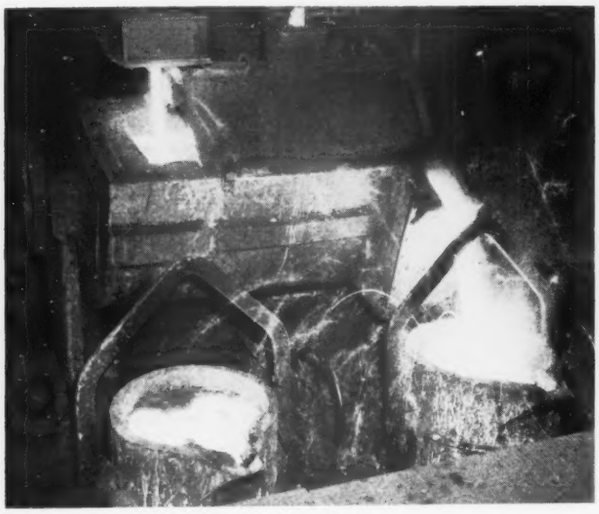
Clays apparently possess both "greasiness" and "stickiness" as a result of their plastic constituent. For example, English ball clays (not common in American foundry use) are definitely more greasy when incorporated in another mixture of nonplastic clays than American ball clays, although all other measurable properties may be identical. In general, American ball clays are more sticky than the English type in such mixtures. Southern Ohio fire clays are definitely more greasy than the sticky Kentucky ball clays, which are considered more plastic. The answers to our questions about plasticity may lie in the greasy and sticky properties of clays.

Cause of Plasticity—The cause of plasticity has been the source of considerable research and the development of a number of theories. Some theories attempt to explain the fundamental source of plasticity in the dry stage, and some deal with the phenomena which tend to influence or vary the plastic strength developed from one of the fundamental sources.

There are seven separate theories which possess merit and with which the foundryman should acquaint himself, in order to understand better the variables which may occur daily in the sand system. Professor (*Please turn to page* 283)



1 Raw material yard at the new pressure pipe foundry of Alabama Pipe Co., Anniston, Ala. Magnet-equipped crane handles pig iron and scrap in making up cupola charges on weigh platform



4 Cupola metal is tapped continuously into 7½-ton mixing ladle before flowing into transfer ladle

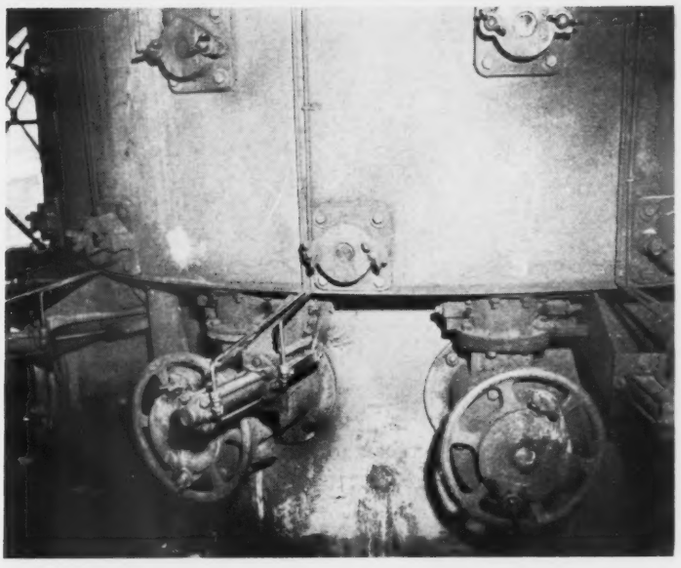
5 Metal being transferred to a pouring reservoir of one of plant's three centrifugal casting machines

Modern Facilities Incorporated in

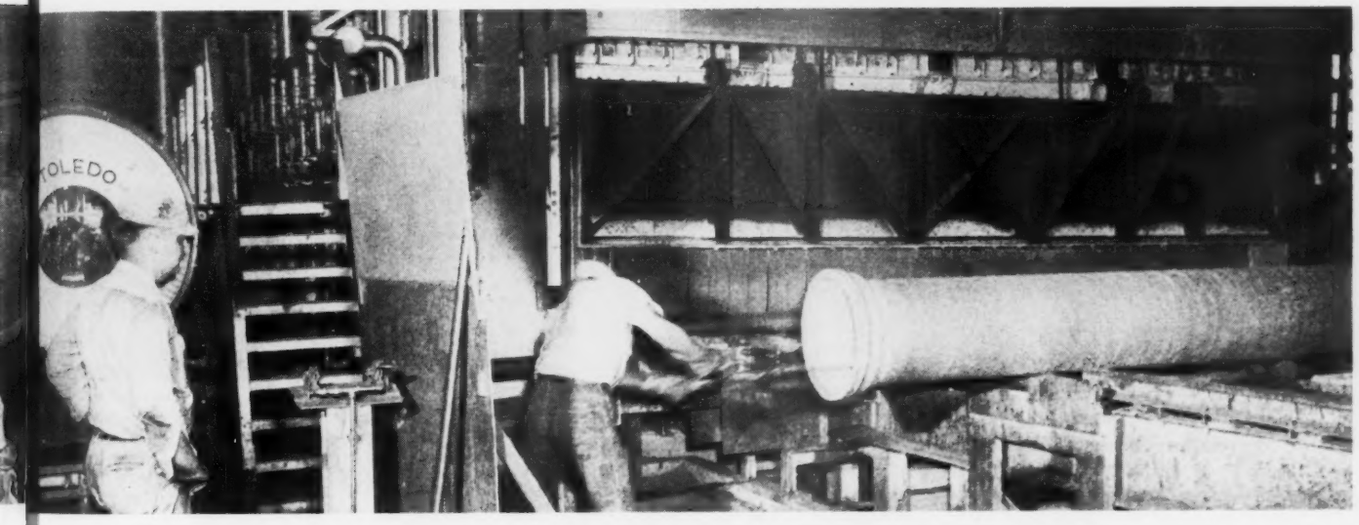
New Alabama Pipe Foundry

By WILLIAM G. GUDE
Managing Editor
FOUNDRY

2 Lifting and emptying the cupola charging bucket is controlled by operator on charging floor



3 Main tuyeres in the cupola balanced blast system are operated pneumatically through remote control device



6 Red-hot pipe ready to enter the continuous annealing oven. This unit, 62 ft long, holds the pipe for five to seven minutes' soaking time at about 1720°F

ABOUT two years ago the Alabama Pipe Co. started production at its new cast iron pipe foundry in Anniston, Ala. The plant incorporates the most modern facilities for high-speed and efficient manufacture of pressure pipe, and represents an outstanding installation in a state which for many years has been noteworthy for its output of cast tubular products.

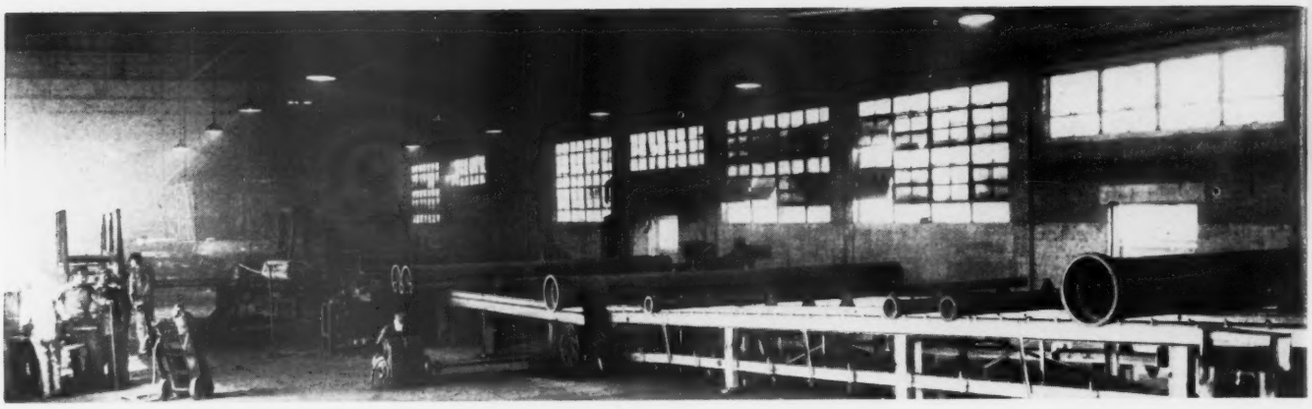
Alabama Pipe Co. operates four other foundries in Anniston, in addition to three plants at Gadsden and one at Talladega, Ala. It casts a variety of soil and pressure pipe, fittings and municipal castings. The new foundry, known as the Water Pipe Plant, is a self-contained unit, located a short distance from the company's main office and its Alabama Foundry Division plant. For two-shift operation it employs about 200 men. Pipe is produced in diameters up to 24 in. by the deLavaud method of centrifugal casting in metal molds. The plant has three casting machines.

Layout of the plant and its equipment was designed to minimize material handling and to permit straight-line movement of the pipe from the casting machines to the shipping dock.

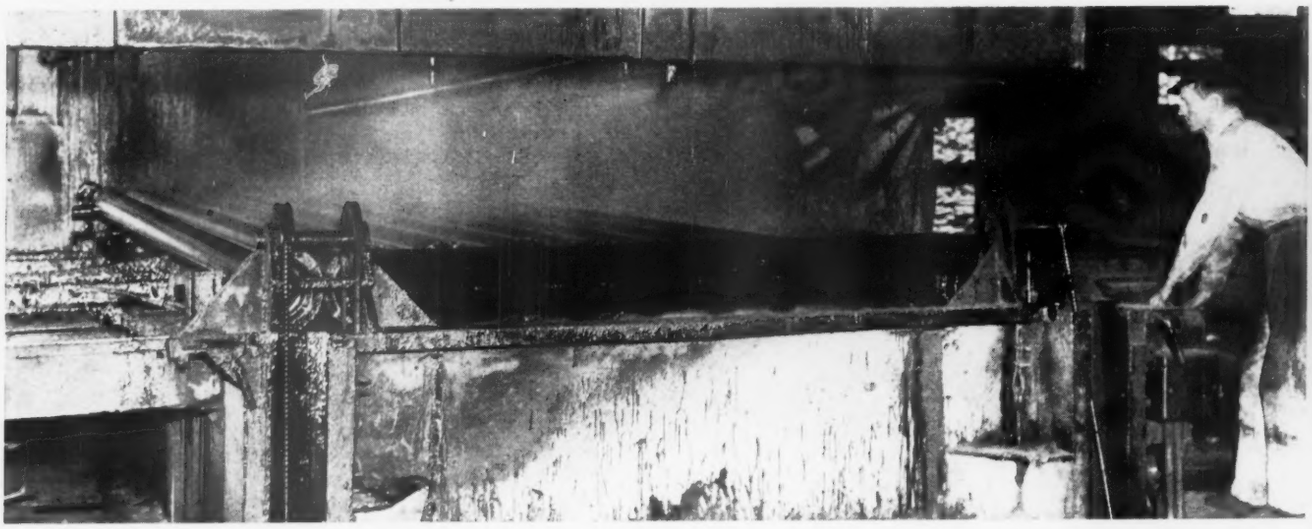
Hot metal is supplied by two 90-in.-diam, balanced blast cupolas lined to 66 in. at the bosh. The cupolas, operated alternately, employ a 16 to 1 iron-coke ratio and melt 17 to 20 tons of metal an hour. They are the front slagging type, the slag discharge emptying into a water bath for quenching.

Close control is exercised over the preparation of hot metal. This starts with the careful selection and weighing of raw material charges and carries through constant checking of operating conditions in the cupola and frequent analysis of the molten metal fed into the casting machines.

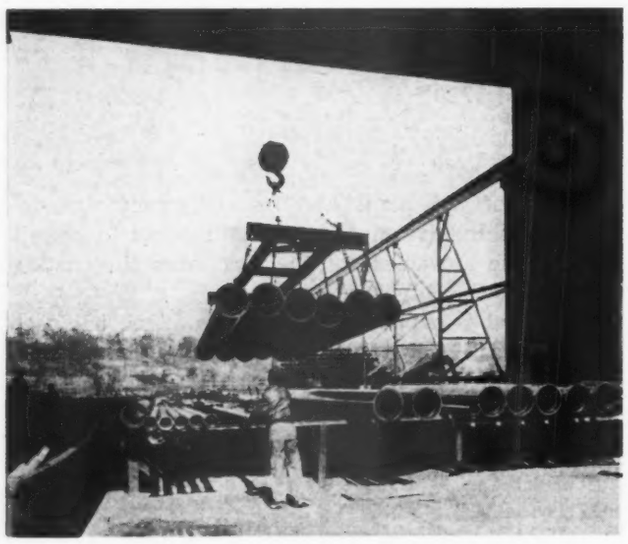
Only two men are required to handle the details of cupola charging. One operator, working from a magnet-equipped crane spanning the raw material yard



7 Pipe leaving the annealing oven is transferred by a rack conveyor to the cleaning stations shown at the left and then to the tar dip tank in the background

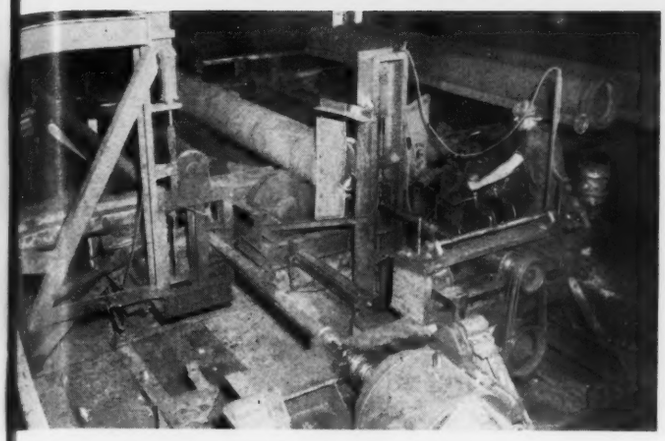


9 Here the pipe is lowered by a rack into a hooded and ventilated dip tank to receive a tar coating

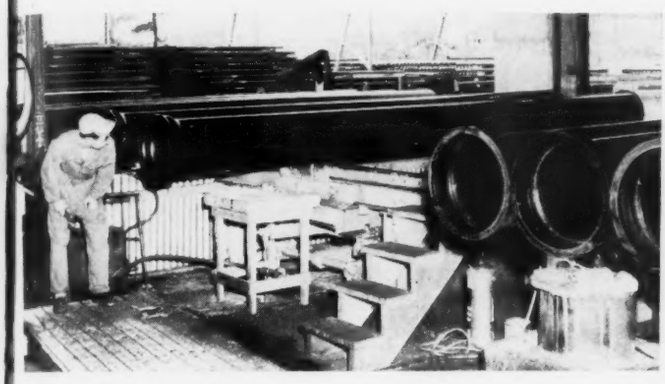


11 Overhead crane picks up pipe for loading into cars or for transfer to yard storage. A rack suspended from crane hook handles six pipe sections at one time

12 Views in the plant laboratory. Housed in a separate building, it is well equipped for the performance of various types of chemical and physical analyses



8 Grinding the inside surface of the pipe by a motor-driven reamer mounted at the end of a long mandrel



10 Final inspection station where pipe is weighed and then dispatched to shipping stand outside

(Fig. 1), makes up the metal charges by depositing scrap and pig iron on a weigh platform. The yard area immediately to the rear of the cupolas where charges are made up is roofed over for protection against bad weather. Scrap and pig iron are stored on both sides of a railroad spur extending through the yard.

The second operator is located on the cupola charging floor (Fig. 2). From a glass-enclosed station overlooking the yard he manipulates the controls to spot a charging bucket, traveling on a transfer car, below the metal weigh platform to receive the charge. He also handles transfer of the bucket to the coke and limestone hoppers and the hoisting of the charge to the cupola charging floor. Any alloy additions to be made to the charges are placed by this operator in the bucket as it passes to the charging door. A charge is made up for a second bucket while the first one is being emptied.

Several instruments are used to keep a continuous and permanent record of cupola performance. These include an air blast volume and pressure recorder, as well as an indicator for measuring metal temperature at the cupola taphole.

The cupola also is equipped with a balanced blast system. Opening and closing the main tuyeres is performed by a pneumatically actuated mechanism operated by remote control. This makes it unnecessary for an operator to take the time for periodic opening and closing of the main tuyere slide valves by hand. A close-up view of the device is shown in Fig. 3.

Cupola metal is tapped continuously into a 7½-ton capacity mixing ladle (Fig. 4). From this ladle the metal is poured at intervals into a 5000-pound capacity ladle mounted on a transfer car. This car travels between the mixing ladle and the casting machines, where the metal is transferred to the pouring reservoirs preparatory to being introduced into the machine molds.

A chill test mold is poured each 15 minutes. If examination of chill depth of the test casting indicates an adjustment is required, No. 8 graphite is added to the molten metal in the transfer ladle. The graphite is fed through a spout leading from a hopper and additions are controlled by an operator at the same station from where the transfer of metal is directed.

Generally the chemical composition sought in the iron is approximately as follows: Carbon 3.60, silicon 1.60, sulphur 0.10 max, manganese 0.35, phosphorus 0.90 max. In addition to the chill test, samples are taken at regular intervals for full chemical analysis. Metal temperature sought on pouring is approximately 2400° F.

Mold Lining Coated with Silica Flour

The casting machine molds are made of alloy steel. The lining is given insulating coating of silica flour prior to the casting of each pipe. Metal is introduced into the revolving mold down a long trough which has a gray iron liner. This trough, extending the length of the mold (Fig. 5), pours the first metal at the far end. As the centrifugal machine is withdrawn from the stream, metal is deposited the length of the mold and a uniform section thickness is attained in the revolving mass. When the metal has solidified, the bell end of the pipe is held and the machine is moved forward to its original position. This strips the pipe from the mold.

The casting machines are located at right angles to the nearby continuous annealing oven, so that when the still red-hot pipe is picked up by an overhead crane the operator is not required to turn it to place it on the rack leading to the oven (Fig. 6). The annealing unit, 62 ft long, is gas fired but also is equipped for oil firing when desired. Temperatures are automatically controlled, with recording pyrometers for the preheating, soaking and cooling zones located in a central control room. Pipe is brought up to its critical temperature of approximately 1720° for five to seven minutes' soaking time before passing on to the cooling zone and exit end of the oven.

Fig. 7 shows the pipe after it has left the oven and is moving down the rack to the cleaning stations at the left. Cleaning comprises three operations. The first is to grind the inside of the bell as the pipe revolves. Next the inside surface of the pipe is ground by a motor-driven reamer mounted at the end of a long mandrel (Fig. 8). The machine is mounted on a track and moves forward for the revolving reamer to abrade the pipe its entire (*Please turn to page* 240)

RESEARCH CONTRIBUTIONS

To the Foundry Industry

This article is taken from the 1952 official exchange paper from the American Foundrymen's Society to the Institute of British Foundrymen. Entitled "Role of the Research Foundry Unit," it was presented before the 49th annual meeting of the IBF held June 10-13 at Buxton, England. The paper discusses results of a number of applied research projects undertaken by the author's company. For a description of the research organization and facilities employed, see "Research at American Steel Foundries," FOUNDRY, January, 1949

By G. A. LILLIEQVIST
Research Director
American Steel Foundries, East Chicago, Ind.

IT IS NOT my intention to discuss the merits of the several kinds of research. In our industry the methods and procedures used to solve problems are not of primary concern. The end result is all important. However, it must be recognized that all applied or industrial research projects originate from fundamental or scientific research. Therefore, both types of research are of extreme importance for the continued development of new processes and new products.

In general, fundamental research is being carried out by universities and various research foundations, while applied research is being concentrated upon by industry. Research has made many contributions to the foundry industry, and this paper will discuss some of them.

Fluidity—In the last few years a tremendous amount of research work has been done in Great Britain and the U. S. A. on temperature measurement and the influence of temperature on the fluidity of steel. It is impossible in this discussion to make reference to all the valuable papers which have been published. However, I would like to pay tribute to J. F. B. Jackson, director of research, British Steel Founders' Association Research and Development Division, who presented an excellent exchange paper before the Electric Furnace Steel Conference of the American Institute of Mining and Metallurgical Engineers in December, 1949, on the subject "Temperature Measurement and Temperature Control in Steel Foundries."[1]

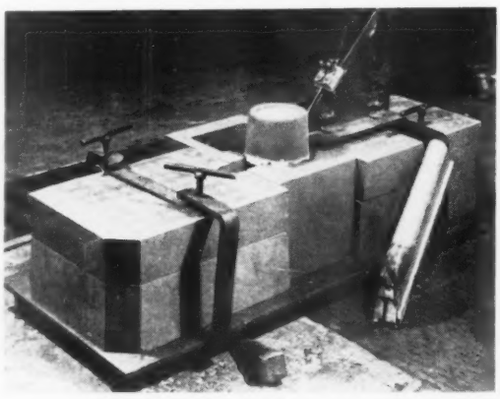


Fig. 1—The fluidity test mold assembly consists of parts which were made in core sand

Because of British leadership in this field, great progress has been made in the U. S. A. All foundries of American Steel Foundries, be they basic open hearths or acid or basic electric furnace shops, are equipped with immersion-type instruments, be it platinum-platinum 10 per cent rhodium, Rayotube or photoelectronic equipment. Our superintendents and melters rely on such tools to assist in producing a quality product.

Instead of giving a long list of publications and references, I will relate our experiences and our findings with temperature measurement and the influence of temperature on fluidity. In Fig. 1 the fluidity test mold assembly, made of core molds, is illustrated.

A 32-gage platinum-platinum 10 per cent rhodium thermocouple is inserted at an angle of 45 degrees into the pouring cup and is shielded by a fused quartz tube 6 in. long with 4 mm outside diameter and ½-mm wall thickness. Accurate pouring temperatures can be obtained by this method if the pouring of the steel is continuous for a period of 7 to 12 seconds. The resulting fluidity test casting is shown in Fig. 2.

The large reservoir should be noted, as well as how the steel enters the downgate and the spirals on both sides. This casting weighs approximately 90 lb, and the large reservoir has been provided in order to control the rate at which the spirals are fed. Very satisfactory results have been obtained at various mold entering temperatures from induction furnace

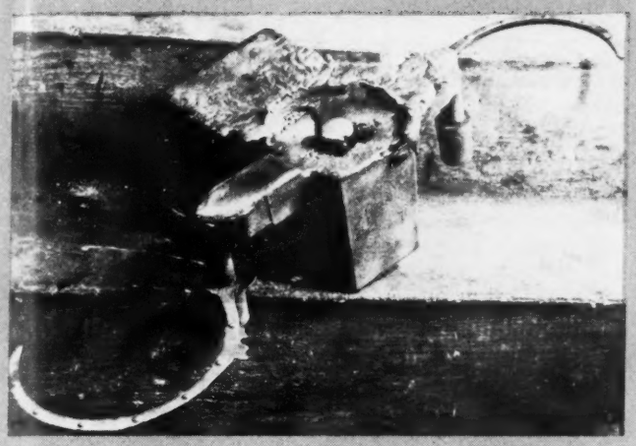


Fig. 2—This fluidity test casting in steel is the result of continuous pouring for 7 to 12 seconds

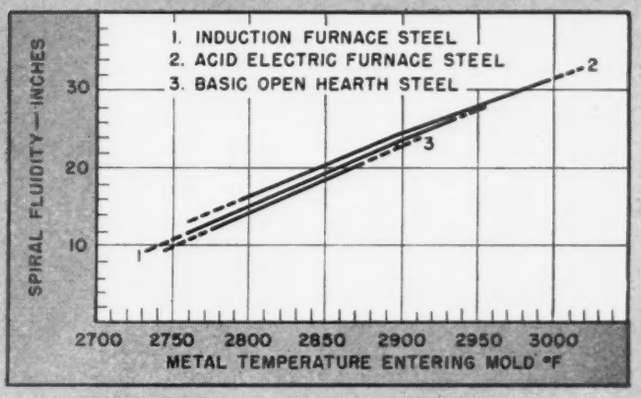


Fig. 3—Fluidity by temperature for (1) induction, (2) acid electric, (3) basic open-hearth steels

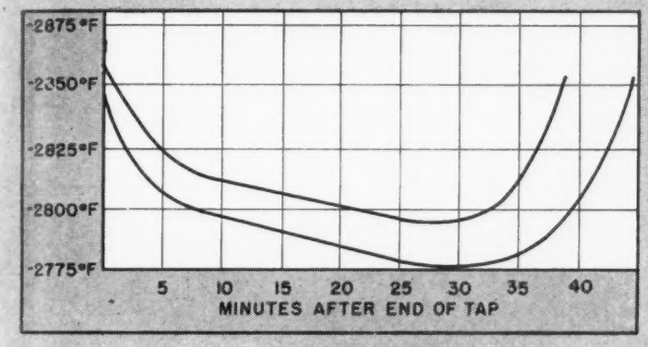


Fig. 4—This chart shows how the temperature of liquid steel increased at the end of the pour

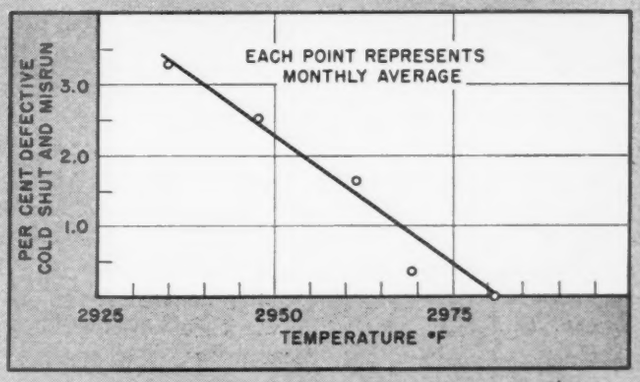


Fig. 5—Illustration of how incidence of misruns and cold shuts is increased by lower temperature

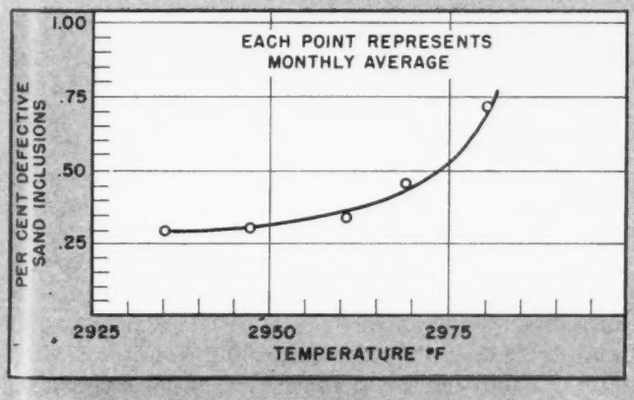


Fig. 6 (above)—Showing how higher temperatures result in greater percentage of sand inclusions

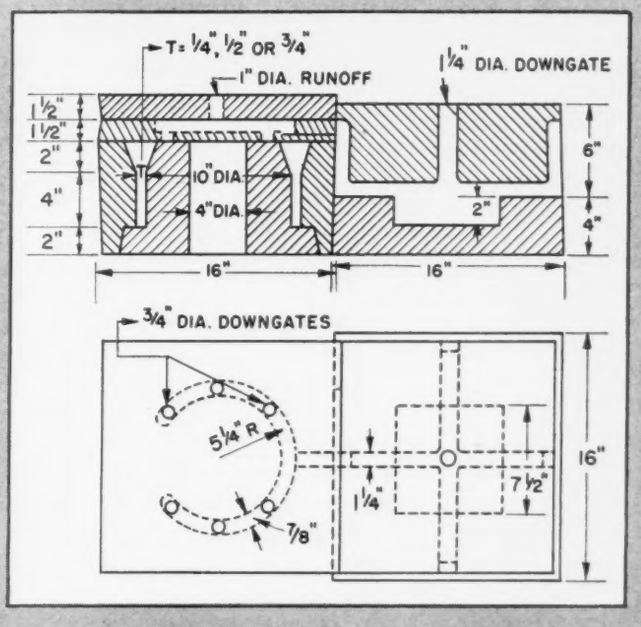


Fig. 7 (right)—Hot tear test core assembly. Gating system permits pouring of one to four castings

Fig. 8 (left) — Pads on outside of 95-lb steel casting used in the hot tearing test are intended to create a hot spot

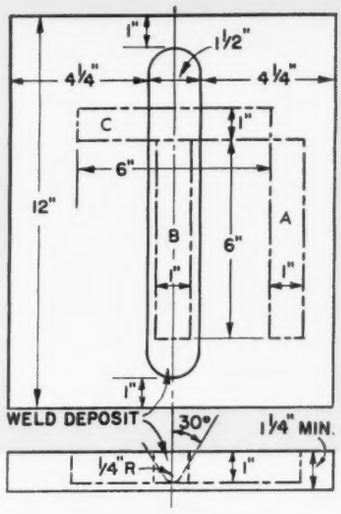


Fig. 11 (above)—Welding test casting. *A* is the parent metal specimen, *B* the longitudinal tensile specimen, and C is transverse tensile specimen

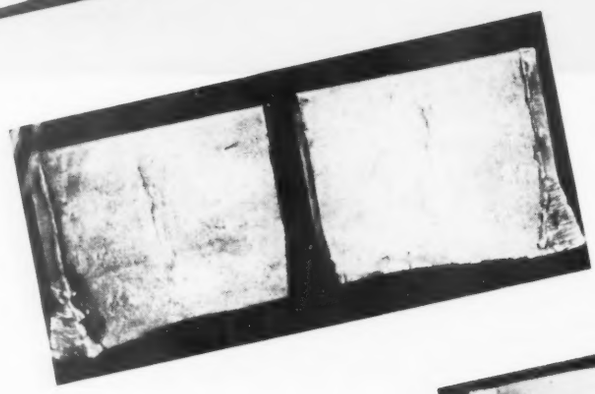


Fig. 9 (right) — Any castings which have slight cracks such as those shown here receive a No. 1 hot tear defect rating

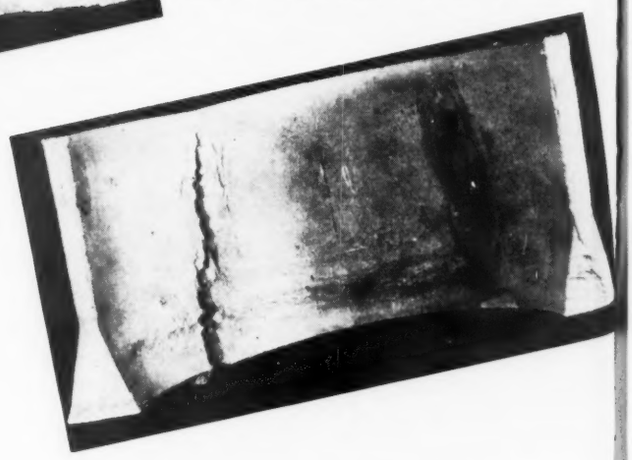


Fig. 10—Hot tearing of the very severe type this casting illustrates causes a No. 8 defect rating

acid electric furnace and basic open-hearth furnace steels of plain carbon steel composition, as shown in Fig. 3.

The highest fluidity was obtained from the acid electric furnace steel which had the highest sulphur content, 0.040 per cent. This result seems to demonstrate clearly that, from a practical viewpoint, the mold-entering temperature is the most important factor in the control of the property of "fluidity."

In spite of all the experiments carried out, it is a well known fact that foundrymen disagree with metallurgists. Foundrymen place emphasis on other factors, the most important one of which is the rate of pouring of the various molds. It must be said at this point that the proper pouring of a mold is a difficult and important task, and should be given more study. Perhaps some method to reduce the element of human error can be found.

Some interesting and enlightening experiments have been made at one of our basic open-hearth plants. The temperature of the liquid steel in a 30-ton ladle approximately 9 in. above the nozzle was determined from the beginning to the end of the pouring operation. Note in Fig. 4 how the temperature of the liquid steel increases at the end of the pour.

This result gave valuable information since it always had been claimed in the past that light-section castings should be poured in the beginning of the heat. Fluidity tests as described have also been made at various positions of the pouring operation and found to coincide with temperature. Other valuable information was obtained from accurate, reliable temperature measurements. Fig. 5 illustrates the influence of temperature on misruns and cold shuts and Fig. 6 the effect on sand inclusions.

As expected, a low temperature will result in misrun castings and a high temperature in erosion and sand inclusions. A full session could be devoted to this subject, but the nature of this paper precludes further discussion here.

Hot Tears—Ever since steel castings have been made, the problem of hot tearing has been encountered, and many investigations have been made to help foundrymen understand and eliminate this defect. Many valuable papers have been written on this subject, such as H. F. Hall's "The Strength and Ductility of Cast Steel during Cooling from the Liquid State in Sand Molds,"[2] the more recent paper by J. M. Middleton and Dr. H. T. Protheroe on "Hot Tearing of Steel"[3] and the work by C. W. Briggs and B. Gezelius on "Studies on Solidification and Contraction in Steel Castings."[4,5]

No useful purpose can be served by reference to all the contributions which have been made. More important are how this problem is being studied and what has been accomplished. The phenomenon of hot tearing in steel castings is very complex because many factors enter the picture, such as the chemical

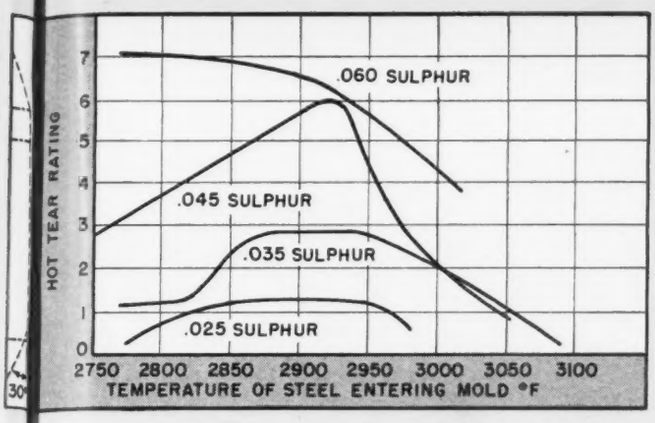

HOT TEAR RATING
.060 SULPHUR
.045 SULPHUR
.035 SULPHUR
.025 SULPHUR
0 1 2 3 4 5 6 7
2750 2800 2850 2900 2950 3000 3050 3100
TEMPERATURE OF STEEL ENTERING MOLD °F

Fig. 12—Relationship between hot tear rating, steel entering temperature, and sulphur content

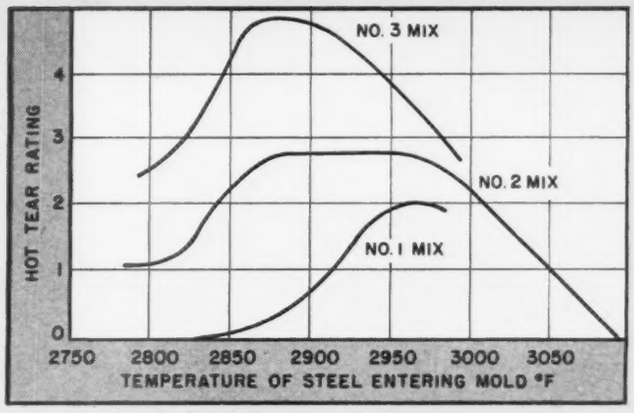


Fig. 13—Effect of three different core sand mixes on occurrence of hot tearing in grade B steel

composition of the steel, the mold-entering temperature of the steel and, probably most important, the proper adjustment of the sand and core mixes. At present, only the occurrence of external hot tears has been studied, because it is believed that they are of greater importance than the internal ones.

After many investigations to find a suitable test casting to evaluate the sensitivity and reproducibility of hot tearing, the core assembly as shown in Fig. 7 was selected. This casting has a ½-in. wall thickness and an approximate ID of 10 in. No doubt other just as satisfactory test castings may be designed, but for our purpose the design selected gave valuable information. In Fig. 8 the as-poured casting is shown. It weighs approximately 95 lb. The casting is poured through the downgate into a fairly large reservoir, the liquid steel rising into another gate and then into the ring gate, which has four small finger gates which feed the casting.

To obtain the mold-entering temperature, a platinum-platinum 10 per cent rhodium thermocouple is inserted into the pouring cup in a manner similar to that of the fluidity test experiments. Note the pads on the outside of the casting. They are 2 in. wide, ⅛ in. thick and run the entire height of the casting. These pads are intended to create a hot spot at this particular location and are in part responsible for the occurrence of hot tears.

Now the problem arises of how to evaluate the severity of hot tears. Perhaps the best way is to illustrate severity by pictures. If, after a severe hot hydrochloric acid etching test for twenty minutes, the casting shows no evidence of hot tears or external cracks, the hot tear rating is 0. If the casting shows slight cracks as shown in Fig. 9, the hot tear rating is 1.

The hot tear rating number is progressively increased as the cracks become more severe. In other words, a hot tear rating standard has been established and serves as a basis of comparison for future evaluation. This method of evaluation has been of great help. With very severe cracks, as shown in Fig. 10, the rating is 8.

During the two years preceding the writing of this report, 60 progress reports based on this test casting have been prepared on such factors as chemical composition, deoxidation practice, pouring rate, mold-entering temperature, variation in core sand mixes, variation in grain size, grain shape and grain distribution and many others. Time does not permit that all these factors be covered, but two illustrations will serve here.

It is a well known fact that sulphur in steel in-

NORMALIZED RESULTS

STEEL	SPECIAL ADDITION	YIELD PSI	TENSILE PSI	ELONG. %	RED OF AREA %	CHARPY RT	CHARPY FT. LB. -40°
1	NO RARE EARTH	45300	75800	30.4	52.7	35.9	11.8
1	RARE EARTH	45900	76100	30.6	56.3	48.0	15.8
2	NO RARE EARTH	55800	93600	24.1	37.8	19.5	7.8
2	RARE EARTH	58000	94200	25.4	45.4	23.4	9.4
3	NO RARE EARTH	63800	93400	27.9	55.3	46.8	18.1
3	RARE EARTH	64100	95400	28.9	60.6	52.5	23.1

STEEL	C	MN	SI	P	S
1	.26	.70	.45	.015	.032
2	.43	.70	.45	.015	.032
3	.30	1.60	.45	.015	.032

QUENCHED AND TEMPERED RESULTS

STEEL	SPECIAL ADDITION	YIELD PSI	TENSILE PSI	ELONG. %	RED. OF AREA %	CHARPY RT	CHARPY FT. LB -40°
1	NO RARE EARTH	81200	104900	18.3	46.5	33.3	25.7
1	RARE EARTH	81000	103900	20.2	50.8	42.5	34.7
3	NO RARE EARTH	118200	126500	16.2	38.2	27.8	23.8
3	RARE EARTH	117300	125800	18.2	47.1	42.5	34.8
2	NO RARE EARTH	136800	154800	11.5	30.5	17.0	16.0
2	RARE EARTH	140800	158000	15.2	44.6	27.8	23.7

Fig. 14 (top)—Physical properties and Charpy impact values at room temperature and subzero with and without the addition of rare earths to steel

Fig. 15 (bottom)—Test results for various steels of same composition after quenching and tempering

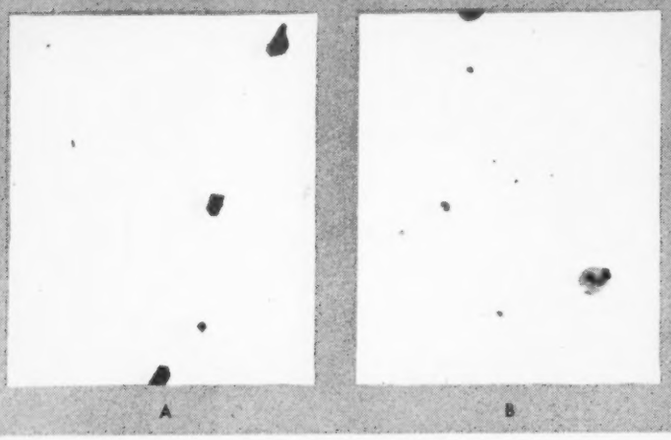


Fig. 16—Change from crystalline (left) to round inclusions (right) after additions of rare earths

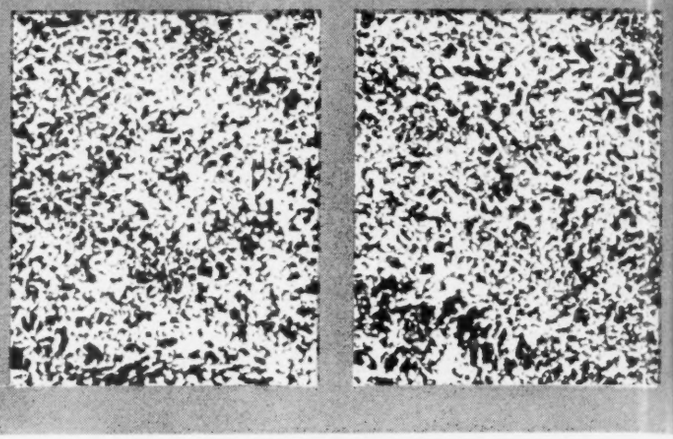


Fig. 17—Normalized 1.60 Mn steel. Left, no rare earth addition. Right, rare earths added. X100

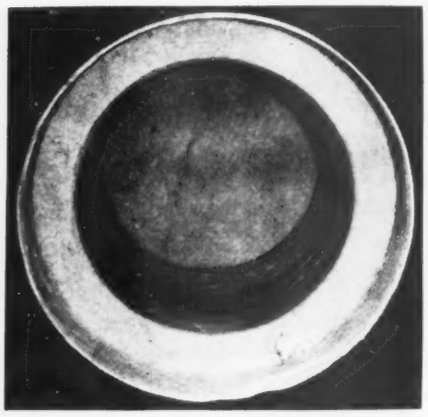


Fig. 20—Type of core used in experiments with shell molding

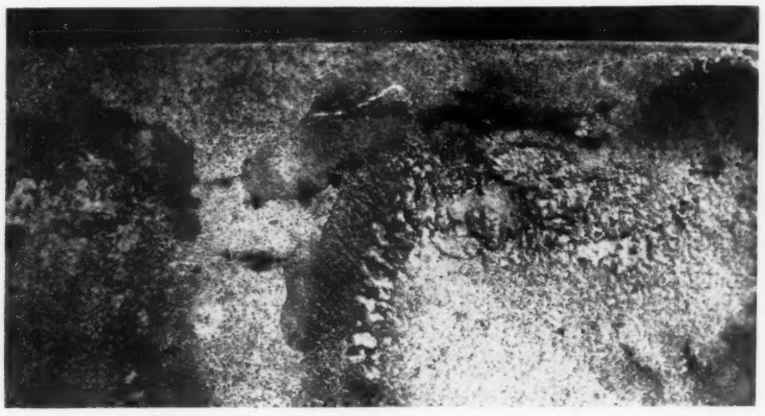


Fig. 21—Defects in the form of small blowholes surrounded by high-carbon steel in shell mold casting

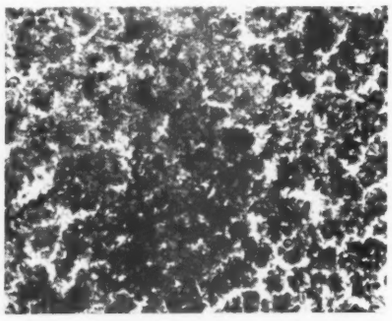


Fig. 22—Steel carburized from phenolic resins of a shell mold

Fig. 23—Micrograph showing carbon pickup at surface of casting

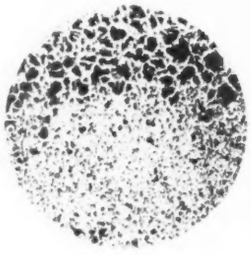


Fig. 24—Use of fewer organic binders in the core mix eliminated the high-carbon layer

creases the occurrence of hot tears, as shown in Fig. 17. At mold entering temperatures of 2800° F with a sulphur level of 0.025 per cent, the hot tear rating number is 0 to 1. With a sulphur level of 0.035 per cent, it is 1. At a level of 0.045 per cent, the rating number is 3 to 4, and at a sulphur level of 0.060 per cent, the rating number is 7.

It is of interest to note that at an approximate-mold entering temperature of 2950°F, the hot tear occurrence decreases very sharply, no doubt because the cores collapse very rapidly at these high temperatures. All the experiments were made from induction furnace heats of plain medium carbon steel of the following nominal composition: C 0.27, Mn 0.70, Si 0.40, P 0.015, S as indicated. The deoxidation practice in all cases was the same. Per ton of charge, 2½ lb of aluminum and 3 lb of calcium-manganese-silicon were used.

The other factor, the effect of core sand mixes on hot tear occurrence is illustrated in Fig. 13. Core sand mix No. 1 has the greatest collapsibility and consequently has the lowest hot tear rating. Core mix No. 2 has an intermediate collapsibility and an intermediate hot tear rating, whereas mix No. 3 is the strongest of the three mixes and has the highest hot tear rating.

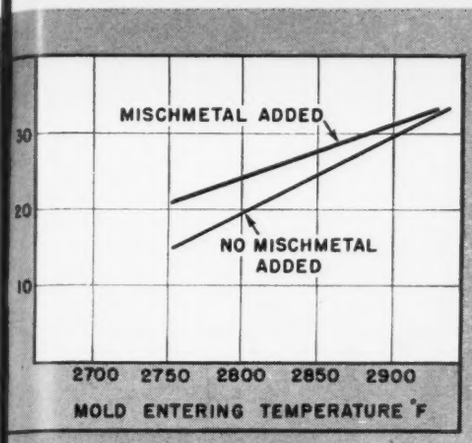


Fig. 18—Showing how fluidity of intermediate manganese steel increases with addition of mischmetal

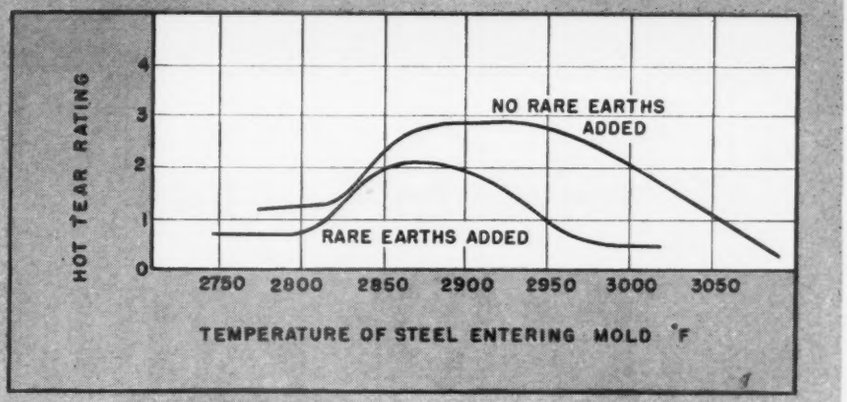


Fig. 19—Influence of rare earth elements on occurrence of hot tears in the special test casting

In all subsequent work, core mix No. 2 was used for comparative purposes, and such metallurgical and foundry factors as are listed below were investigated. Metallurgical factors included influence of mold entering temperature; influence of C, Mn, Si, Cr, Ni, Mo and combinations thereof; influence of phosphorus and sulphur and influence of deoxidation practices with small and large amounts of aluminum, titanium, selenium, and mischmetal.

Among foundry factors included were influence of grain fineness, influence of grain shape, influence of grain distribution and influence of various binder additions. Each of these factors could constitute a separate paper and therefore will not be discussed further.

Welding Electrodes—In recent years considerable pressure has been exerted on steel foundries to use better welding electrodes. Many customers' specifications require that the weld deposit have approximately the same chemical analysis and mechanical properties as the parent metal.

Everyone realizes that it is difficult to match the chemistry of the weld deposit with the parent metal, especially in the higher carbon ranges. However, satisfactory welding electrodes have now been developed which will give approximately the same physical properties in the weld deposit as in the parent metal. This holds true for various heat treating operations such as normalizing and tempering, quenching in liquid media and tempering. In order to evaluate various welding electrodes, we designed a test casting as shown in Fig. 11.

Tensile test bars and Charpy impact specimens are removed as indicated after the appropriate heat treatment. If the welding electrode meets the properties with a sufficiently large factor of safety, it is recommended to our foundries, where further experiments are carried out. Should the welding rod be satisfactory at all the plants, it will be adopted as standard. Only lime-ferritic or low hydrogen containing welding electrodes are considered, for both dc and ac welding machines.

Incidentally, the same test casting is being used for qualification tests of individual welders. Before a welder is permitted to weld on critical sections of a casting, he must produce a weld in the test casting which meets a radiographic standard as well as possesses the required physical properties. Should he fail to meet the requirements, he is given another test. Failure to qualify necessitates his removal from the welding occupation.

Many other experiments are being carried out at both our foundries and at the research laboratory, especially with regard to the removal of gates, risers and various foundry defects. This problem is nationwide, and the Research Committee of the Steel Founders' Society of America undertook an excellent project on this subject. I refer you to Research Report No. 26 on the subject of "Metal Removal in the Cleaning of Steel Castings."[6]

Inspection—In co-operation with our foundries we have set up radiographic and magnaflux standards for our most important castings, such as railroad side frames, couplers, yokes, brake beams and bolsters. Such standards are only applicable to long-run repetitive work. The castings are divided into various zones, where zone 1 is a highly stressed area, zone 2 a medium stressed area and zone 3 a low stressed area. Zone 1 must meet the highest standard, must be entirely free of internal and external cracks and can be permitted only small amounts of lack of fusion, porosity, sand inclusions and shrinkage.

These standards have been set up by the correlation of data obtained through many years of experience, testing castings statically, dynamically and in service.

We are searching for a quicker and more positive method of magnafluxing unmachined castings. The use of copper prods for magnafluxing castings is being discouraged because at the point of contact of the copper prod, a small hardened area forms which could develop into small cracks. Such other methods of magnafluxing are being investigated as the coil method, magnaglo and others. The use of dye check, etching tests and ultrasonic testing methods also are continuously under consid- (*Please turn to page* 258)

How to Develop

CAST PRODUCTS

The author describes a successful method of product design that may be adopted by any foundry product development department. This paper was presented at the 1951 Technical and Operating Conference, Steel Founders' Society of America

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Fig. 1—Freehand sketches, such as shown here, represent the first step in development of new designs

Fig. 2—The mockup permits the designer to see his visualization in a solid form for the first time

Fig. 3—The design has reached the stage of a pattern with wooden gates and risers

IT HAS often been said the last few years that a method of product development is needed by steel foundries. To help fill this need, this paper presents a proved and practical method of product design that may be adopted by any foundry product development department. It can operate at minimum cost for production of the best possible product in a minimum length of time.

At present, steel foundries are doing various phases of this work and have many of the facilities required for a product development department. To date, however, most foundries that are doing product development work are not obtaining sufficient engineering information on existing designs. As a result, they are handicapped in their attempts to do good jobs of redesigning. Every engineer knows the need of having accurate information before he can design a part properly, and every foundryman should be alert to the fact that good structural design is compatible with good foundry practice.

The procedure described in the accompanying outline will enable the foundry product engineer to meet customer requirements at the same time that he permits the foundry to use good practice and thereby achieve economical operation.

The ten basic points in the outline should be followed in the order given. Otherwise, the desired results may not be obtained, and the product engineer will find himself in trouble. Because the paper will not discuss technical phases of design procedure, the illustrations merely present the various steps in the outline of product development.

Initial Customer Contact—No matter how a contact is made, whether by a salesman or by an inquiry through the mail, our main concern is with the procedure to be followed with the customer. One of the first questions that arises and should be settled is "Why cast it?" Settle this issue with the customer and yourself, and you will have the customer's complete co-operation in the development of the project at hand. If the part should not be cast in steel, tell the customer why. Frankness at this point will pay dividends in the long run, and this question will stimulate the thinking of everyone concerned. There are many reasons for an affirmative answer. The casting process in itself is the most direct method of producing either intricate or simple parts, and range of mechanical properties is wide. There are many other reasons, too, of course.

Another question of vital importance is the quantity involved. It will determine how the part should be developed. Find out if time is available for product development. The size and nature of the part will determine the amount of

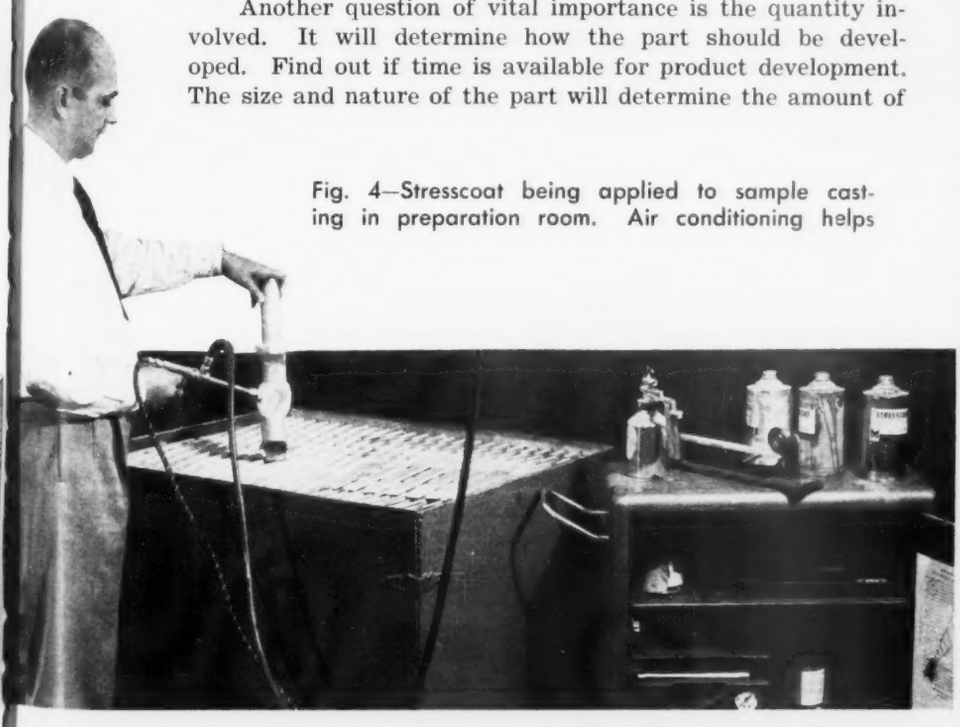


Fig. 4—Stresscoat being applied to sample casting in preparation room. Air conditioning helps

A Procedure for
FOUNDRY PRODUCT DEVELOPMENT

1. Initial Customer Contact
   a. Why cast it? Quantity?
   b. Is time available for product development?
   c. Is present design satisfactory—functionally? Structurally? Foundry-wise? (Get service experience)
   d. Is weight satisfactory?
   e. Is cost a factor?
2. Proposal for Product Development
   I Development
   II Production
3. Evaluate Present Design (if available)
   a. Experimental stress analysis
4. Analysis of Product Design
   a. Function (Will it do the job?)
   b. Structure (How long?)
      Study of proportions and change in shape
   c. Weight
   d. Castability—
      (Free of shrinks, etc.)
5. Method of Product Design
   a. Free-hand sketches
   b. Mock-ups
   c. Consultation with Pattern Shop and Foundry
   d. Engineering drawing of new design
   e. Pattern layout and construction
6. Production of Sample Castings
   a. Close engineering follow-up with molder
   b. Engineering inspection (x-ray, dimension, weight)
   c. Machine
7. Evaluate New Design (grading your paper)
   a. Experimental stress analysis
8. Modification of New Design
   a. Improve stress distribution (by adding or removing metal adjacent to highly stressed areas)
9. Re-evaluation of New Design
10. Customer Approval for Production Release

time required. It should be stressed that this method requires less time and proves the design before release for production. The generally accepted method releases largely unproved designs for production and results in costly errors.

Is the present design satisfactory functionally and structurally? Find out if the part functions properly. Is the structure adequate to carry the load, or is it massive and overdesigned? Will the present design permit the foundry to produce the part economically? Get the service experience. Find out whether the part has failed and where and under what conditions. All these facts are vital information that will help the foundry engineer to redesign the part properly.

Is weight satisfactory? Maximum strength and minimum weight are always desirable. A reduction in weight also usually results in a reduction of price. Don't sacrifice strength for a reduction in cost, however. Don't sell more steel than is required, either. It is vitally important to conserve steel, and the foundry product engineer can guide the customer to use this material wisely and to its best advantage.

Is cost a factor? It invariably is, and usually a reduction in cost is achieved when the part is properly designed, because the casting can be produced more economically.

Who is to pay the cost of product development? Usually the customer is willing to pay part or all of it when he realizes that he will obtain facts that are vitally important to his finished product. In some cases it is wise for the foundry to absorb some of the cost in the interest of future business involved. This field is a fertile one for foundries to develop, for this method not only keeps old business, but insures new production.

Proposal for Product Development—At this time a written proposal to the customer specifying the cost, the equipment required and the nature of the test is in order. This will serve as a guide to co-ordinate the efforts of the customer and the foundry in redesigning the part. The customer is always interested in the cost of producing the redesigned part. Therefore, an estimated selling price should be submitted for his consideration. It should be pointed out, however, that the results of the test may alter the proposed design and have an effect upon the selling price.

Evaluation of Present Design—The engineer can easily evaluate the present design by testing the part in its own environment or under simulated conditions. Brittle lacquer and strain gages are excellent methods of evaluating the design quantitatively and qualitatively. These are the tools that will measure the strains directly, thereby allowing the engineer to deal with facts when he redesigns the casting. Technical procedure involved in the application of these tools will be discussed later.

Analysis of Product Design—Using the facts that have been obtained by running experimental stress analysis on the present design, analyze the functions it must perform. In short, will it do the job? Is the structure adequate for satisfactory service life? The results of the experimental stress analysis

Fig. 5—Areas of high stress in the sample casting are shown by cracking at right angles to the maximum principal tensile strains

will enable the foundry to make changes in proportion and shape without guesswork.

Determine the weight of the present design and look for possible weight reduction. Does the design lend itself readily to casting in steel which will be free from shrink, sand, cracks and other defects? Remember that a good design does not require complicated cores, gates and risers.

Method of Product Design—After the product has been analyzed, the product engineer is acquainted with all the facts and is in a position to redesign the part. The first step in this method is freehand sketches of the proposed design, as illustrated in Fig. 1. The sketches give him freedom because his thought processes are not disturbed by technical details of engineering drawing. While the general shape of the casting is defined by these sketches, the designer's ideas are solidified for the first time in a mockup (Fig. 2). The mockup shown is for an element of a cast steel crankshaft and was made in about two and one-half hours. The materials used were wood and plasticine clay. Frequently a mockup can be used as an experimental pattern. It brings into being the desired structure and is readily understood by everyone concerned. After its creation, the product engineer is ready for a consultation with the pattern shop and the foundry.

This is a conference with the pattern shop foreman, the foundry superintendent and his foremen. They use the freehand sketches and mockup to determine how the pattern should be laid out, how the foundry can best cast the part and how to work out the gating and risering system. Usually during these consultations, this kind of observation occurs: "Why don't you do it this way? Then that section can be fed." This procedure reflects the distinct advantage of having freehand sketches and mockups already made at this point. Everyone can make his suggestions readily understandable either by sketching or by adding to or taking clay from the mockup. The product engineer observes their suggestions and, if possible, incorporates them into the design. This is the point of union between the design and good foundry practice.

The next step is the engineering drawing, on which pattern layout and construction should be shown. The pattern, with wooden gates and risers attached, is shown in Fig. 3. In this manner the engineer establishes control over the gates and risers and eliminates guesswork about this vital phase of the design's de-

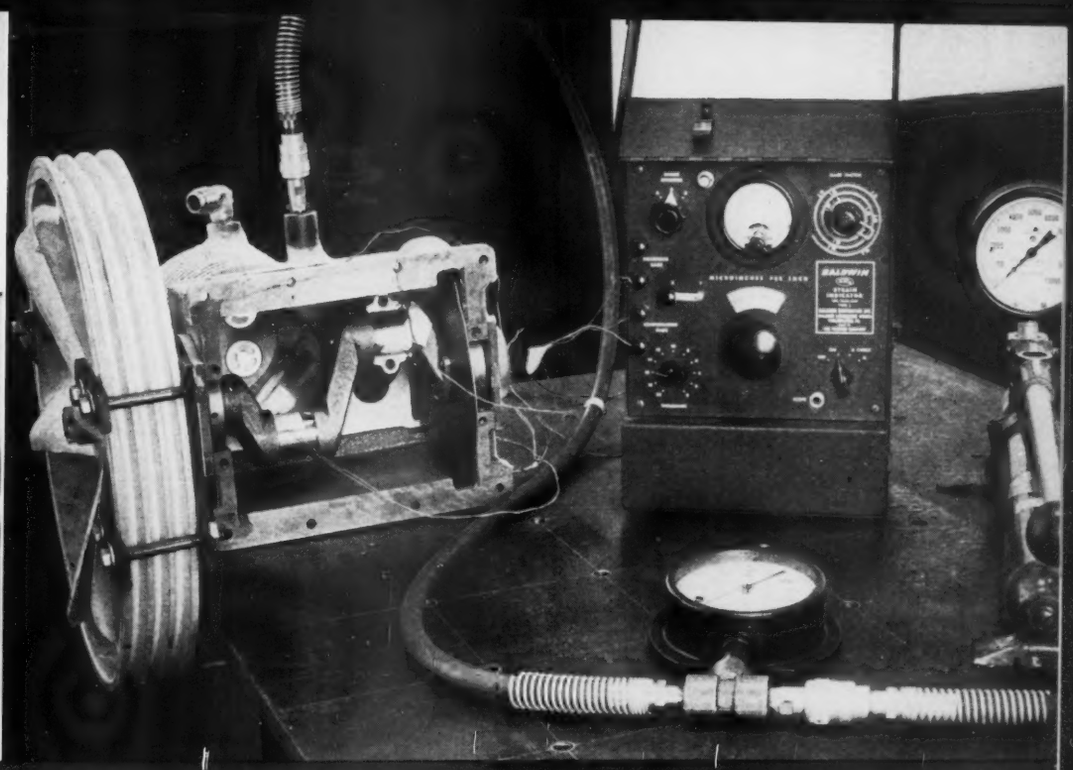


Fig. 6—The laboratory setup for running the experimental stress analysis in the test room

Fig. 7—This is the equipment and setup for the strain gage survey following the stress analysis

velopment and progress toward eventual production.

Production of Sample Castings—To know what effect the design has upon the molding process, close engineering followup with the molder is necessary. Changes in design may be possible that will improve molding with production pattern equipment.

The engineer should inspect the sample castings for visual and hidden defects and should check gross weight, net weight and all dimensions. The casting may be machined and assembled either by the customer or the foundry. It is necessary that the engineer follow the complete production of the sample castings since such a step will give him knowledge pertinent to his design.

Evaluation of New Design—The foundry product engineer needs a properly equipped stress analysis laboratory to run tests. The laboratory requires two rooms approximately 12 ft square. One room, equipped with a stresscoat outfit and a spray booth with blower system, is for preparation of the specimen as shown in Fig. 4. The other room, seen in Fig. 6, is for testing. It is equipped with a heavy steel testing table and hydraulic jacks and is air conditioned if possible.

While stresscoat can be used without control of temperature and humidity, an air conditioning unit will increase chances of success. Failure to predict the weather sometimes results in failure of the test, and all work and time spent in preparing the specimen is a total loss. The techniques involved in the use of stresscoat are exacting, and all precautions

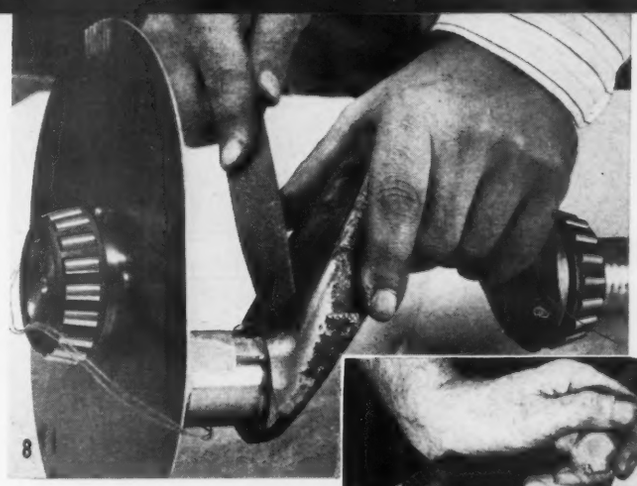


Fig. 8—Removing metal which is adjacent to highly stressed areas

Fig. 9—Adding metal, as indicated by clay, can be done by welding

should be followed if desired results are to be obtained.

Stresscoat, a commercially available brittle lacquer, indicates areas of high stress by cracking at right angles to the maximum principal tensile strains (Fig. 5). Stresses may be computed from the strain lines with an accuracy of 2 per cent. When quantitative information is required, stresscoat is essential, but should be followed by a strain gage survey (Fig. 7). (*Please turn to page* 205)

Fig. 1—Showing sheet brazing material in place on the three right-hand components of a cylinder head

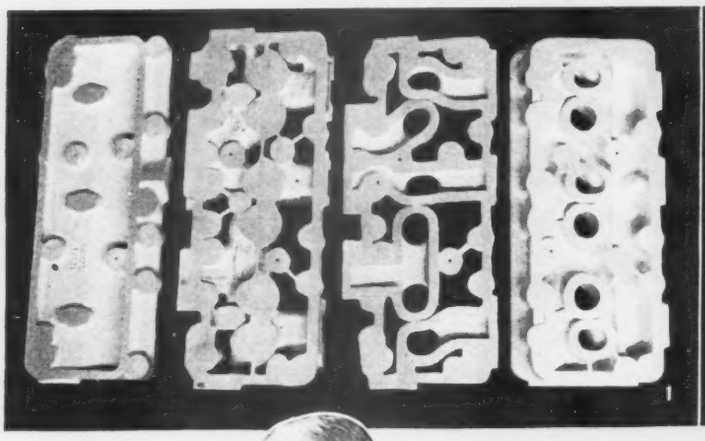


Fig. 2—Slightly exploded view of the cast slices showing how they are assembled with brazing sheets

Fig. 3—Completed head after brazing but prior to finishing, machining

Fig. 4—Sections of aluminum engine block being assmbled by Paul Crane, Alcoa engineer

Brazing Offers Ec

in Makin Alu

By WILLIAM G. GUDE
Managing Editor
FOUNDRY

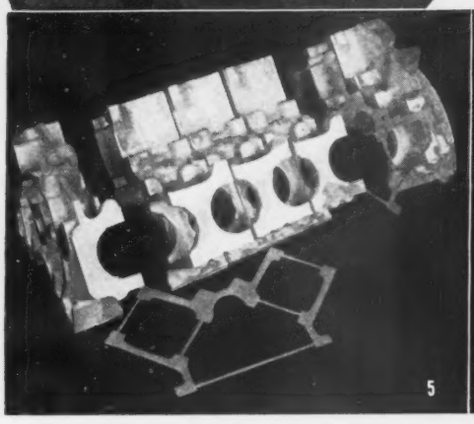


Fig. 5—Five castings make up assembly for V-8 engine block

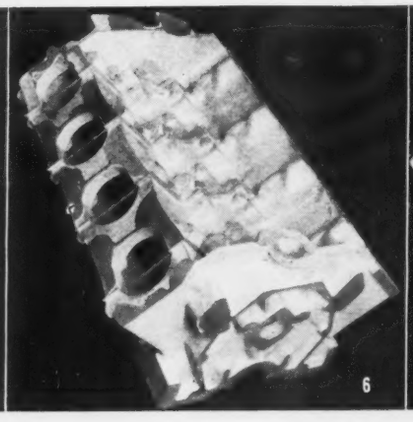


Fig. 6—Engine block assembled with brazing sheets in position

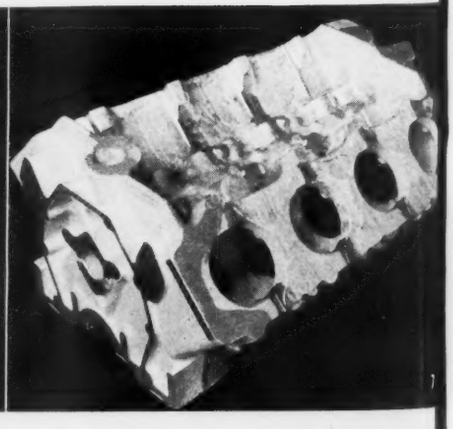


Fig. 7—Appearance of the block after furnace brazing completed

Economy Aluminum Castings

CERTAIN types of sand-cast aluminum parts can be produced more economically by a new method developed by the Aluminum Co. of America at its Cleveland Development Division. The method is particularly adapted to castings of complicated design which ordinarily can be made only as sand castings and which involve considerable core work.

The process consists essentially of making several comparatively simple castings and then brazing them together to form the desired end product. Recent improvements in aluminum brazing alloys and techniques make this joining method possible. Obviously, the cost saving and other advantages of the process can be most fully realized in the case of large-volume production which would permit the component parts of the final casting to be made economically in permanent molds.

A case in point is the automotive engine cylinder head. These heads ordinarily are cast of gray iron in cored sand molds. Because of their shape they are not adapted to production in permanent molds, even if made of aluminum. In making a head as a brazed assembly, four individual castings are first produced. They represent four layers which, when assembled sandwich-like as shown in the accompanying illustrations, comprise a complete head. However, each casting is of relatively simple shape and has no involved recesses that would preclude production in a permanent mold.

The castings shown here (Figs. 1-3) were cast in C612 alloy. This is a non-heat treatable alloy having excellent brazing characteristics, good corrosion resistance and a relatively high melting range—1120-1190°F. It has a tensile strength of 35,000 psi, yield strength of 18,000 psi, elongation of 8 per cent in 2 in., and brinell hardness of 70. Alcoa brazing alloy 718 was selected for the joining medium. It was used in sheet form, about 1/32-in. thick, and was stamped out like a gasket to the contour of the mating faces of the adjoining castings. A brazing flux, Alcoa No. 33, was applied to the joining surfaces of the slices to permit the filler metal to wet them.

Preparatory to brazing, the cast slices and gasket inserts were cleaned with a mild caustic etch, followed by a cold water rinse, a nitric acid dip and a final rinse in hot water to facilitate drying. After the parts were fluxed and assembled, Alcoa 2S pins were inserted to hold the assembly in alignment while being brazed. These pins were located in stud bosses later drilled out in final machining.

During brazing it is necessary to have a definite separation between adjoining parts. In the case of the cylinder head this was accomplished by placing aluminum washers of the required thickness between the slices. This also assisted in maintaining dimentional accuracy of the head.

The assembly was brazed in an electrically heated furnace. Temperature was brought up to 1085°F in about 18 minutes, and the assembly then removed and allowed to cool in air to about 900°F before quenching in water having a temperature of 180°F. The cooling cycle prevents distortion during quenching and allows the molten brazing material to solidify. Any loss of strength in the casting alloy as a result of the annealing effect of the brazing operation is restored in about one week at room temperature. Final step, to insure removal of all flux, was a 15-minute bath in nitric acid of 58 per cent concentration at room temperature, followed by a hot-water rinse.

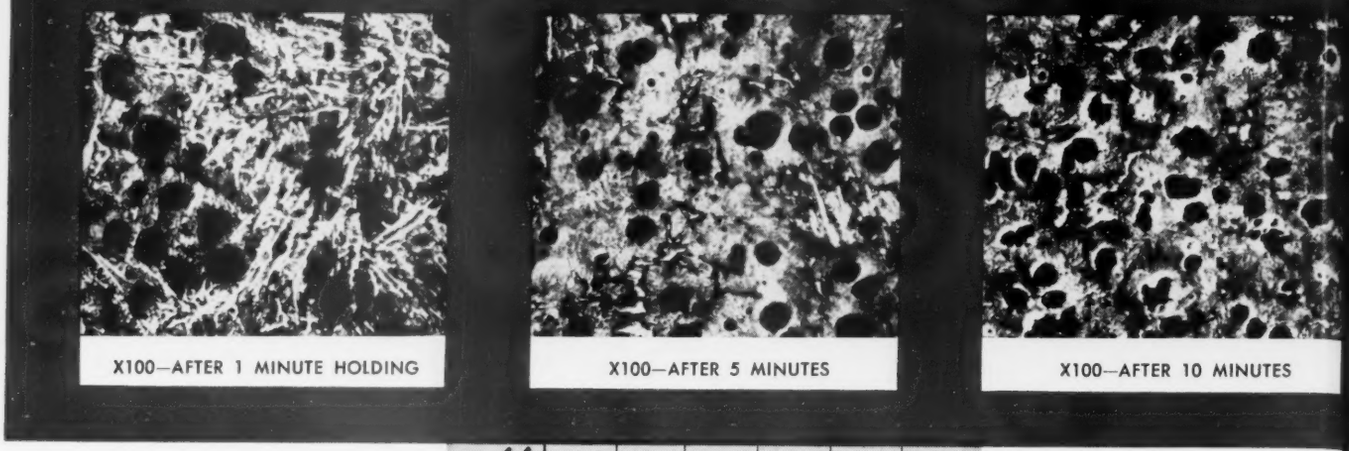
Results Are Highly Satisfactory

Laboratory and operational tests of the brazed heads have been highly satisfactory, according to Alcoa technicians. Strength of the brazed joints approaches that of the parent metal, and extensive dynamometer and road tests have disclosed no failures in any sections of the part.

While commercial production of brazed aluminum cylinder heads still is in the future, several automobile companies are actively investigating its possibilities. In addition to the advantage of increased heat radiation and somewhat higher engine horsepower afforded by an aluminum head, the casting surfaces have the good finish and accurate section thicknesses typical of a permanent mold product. These latter properties minimize cleaning and machining operations.

Various other castings lend themselves to production by this brazing method. The brazing alloys also are finding broader application in parts assembly, offering an effective means of joining together two or more wrought aluminum pieces, or of affixing wrought sections to castings. The brazing alloys are available in various forms, the choice being dictated by the shape of the parts to be assembled.

Another instance of a complicated aluminum casting made of a brazed assembly is the v-8 engine block shown in Figs. 5-7. It is made up of five individual castings, but in this case the joints are vertical instead of horizontal as on the cylinder head. Shape of the brazing alloy, cut from a sheet, is shown in the foreground of Fig. 5. After application of a flux, the component castings are assembled as indicated in Fig. 4. The assembly with brazing inserts in place is shown in Fig. 6 and the head after the brazing operation appears as in Fig. 7.



Figs. 1-6 (above)—Showing the microstructures of magnesium-treated irons after being held for varying times. Additions of 0.9% Mg were made at 1400°C in form of 20% Mg, 30% Si, 30% Cu, 15% Fe, 5% Al magnesium alloy

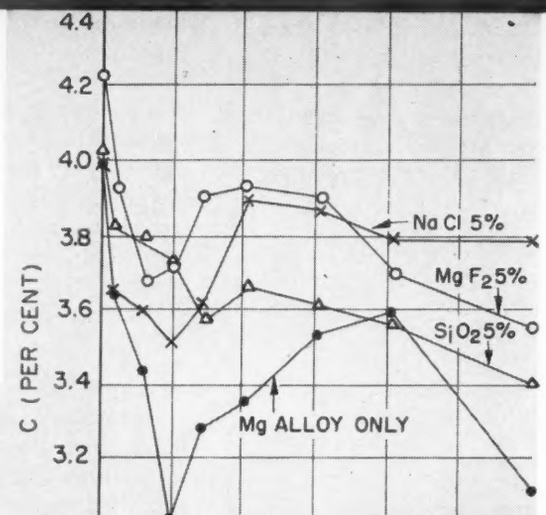


Fig. 8 (left) — Carbon content variations as holding time lengthens

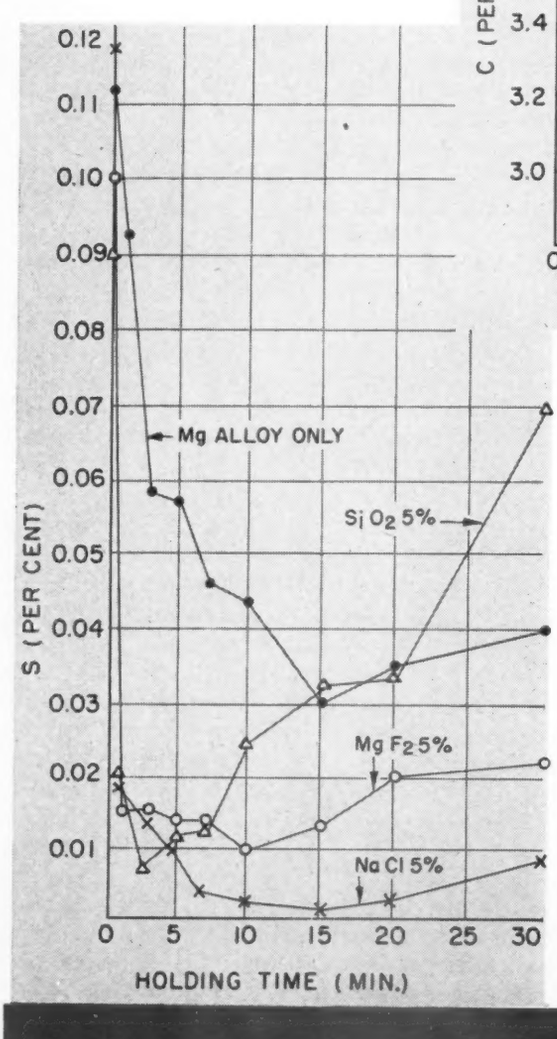


Fig. 7 (left) — Hold-time relationship to the sulphur content

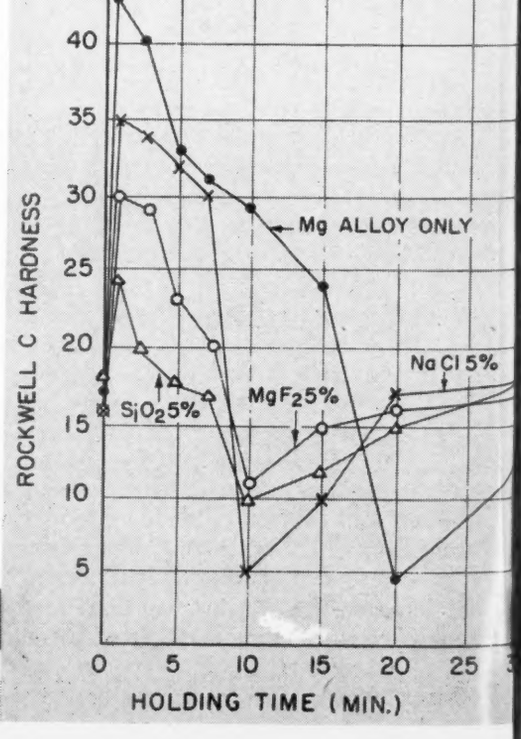
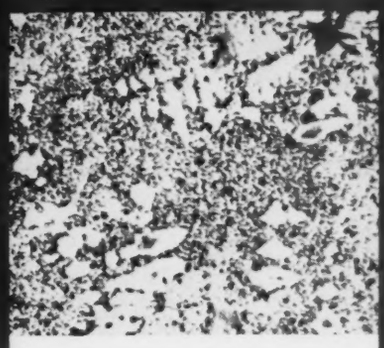


Fig. 9 (below)—Hardness variations with different holding time

X100—AFTER 15 MINUTES



X100—AFTER 20 MINUTES

X100—AFTER 30 MINUTES

Chemical and Physical Changes in Magnesium-Treated Irons

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Tokyo Institute of Technology, Tokyo, Japan
and RENPEI YODA

USING 14-mm diam specimens cast in dry sand molds, the authors made a study of some of the chemical and physical changes in magnesium-treated cast irons by varying the holding time before pouring, as well as by addition of chlorides, fluorides and oxides.

In one case, 0.9 per cent magnesium in the form of a Mg-Si-Cu-Fe-Al alloy containing 20 per cent Mg was added to the iron at 1400°F. The metal was held at 1350 to 1400°F for periods up to 30 minutes before pouring. In the other case a 95 per cent magnesium alloy with 5 per cent chloride, fluoride or oxide was added to the iron. Results are shown in the accompanying illustrations.

Spheroidization of graphite resulting from the alloying of magnesium with iron is accompanied by deoxidation, desulphurization and decarburization. Subsequent disintegration of the spheroidal form is accompanied by resulphurization and recarburization from the slag into the iron. At maximum recarburization, the alloying effect of magnesium practically has disappeared, and the microstructure becomes eutectic graphite plus ferrite.

At longer holding times decarburization is seen again owing to oxidation of the molten iron, and the microstructure becomes flakey graphite plus pearlite. When chlorides, fluorides or oxides are used with the magnesium alloy, the spheroidizing effects decrease. Experimental results are shown in Figs. 7 to 9.

Reactions during the holding period may be classified from the viewpoint of deoxidation into three stages as follows:

1. That of fully-killed and magnesium-alloyed state in which the spheroidal graphite iron is formed.

2. That of the medium-killed and magnesium-free state in which eutectic graphite iron is formed.

3. That of the rimmed state in which flakey graphite iron is formed.

Hardness of iron first increases with the magnesium treatment, and then decreases with the length of the holding time. It shows the minimum hardness at the maximum of recarburization. However, at much longer holding times the iron hardens again until it has almost the same hardness as that before treatment with magnesium. This result coincides well with microscopic observations as depicted in Figs. 1 to 6.

From these results it is presumed that the slag formed instantly upon magnesium addition is similar to the calcium-carbide slag formed at the reducing period in the direct-arc electric furnace, except that magnesium in the former case is acting as a substitute for calcium in the latter.

Accordingly a suitable molten iron which easily causes spheroidization of graphite by addition of magnesium must be such that a magnesium-carbide slag with strong reducing action also may be formed easily. Hence, the raw iron and the melting practice must satisfy that condition. However, while the condition is a necessary one, it is insufficient to result in spheroidization of graphite in all cases since the presence of small amounts of certain chemical elements or radicals is sometimes injurious.

QUESTIONS

Hold the ladle steady . . . Why parts wear excessively.

Need close coupling between runner and casting.

Strainer cores form a choke in the gating system.

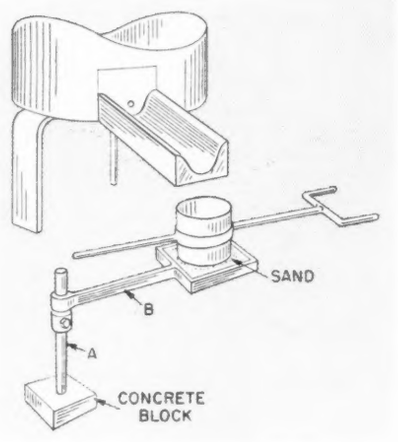
Support Ladle Under the Spout

QUESTION Several years ago in FOUNDRY we read an illustrated description of a revolving rig for supporting a shank ladle under the cupola spout. When not in use, or when a crane ladle came under the spout, the rig could be pushed out of the way. We have no way now of checking up on this bit of foundry practice, and wonder if you could supply the information.

ANSWER Our congratulations to you on a remarkable and typical foundry memory, even if you do stretch the meaning of the word "several" to, if not beyond, the usual elastic limit. The article and sketch to which you refer appeared in the Nov. 1, 1920 issue under the title "Revolving Rig Holds Bull Ladle in Position." The text, brief and to the point follows:

In the ordinary method of catching metal in bull ladles direct from the cupola spout it is necessary either to set the ladle on the floor, far below the spout; set the ladle shank on a pair of more or less well made horses, or suspend the ladle from the crane hook while the metal is running into it. The objection to the first method is that a stream of iron falling from a high spout may damage the ladle lining.

Recently we installed a device which has given general satisfaction. This device shown in the accompanying freehand sketch consists of a short length of 3-in.-diam steel shaft *A*, set upright and bedded at the lower end in concrete at the floor level. A cast iron arm *B*, terminating at one end in a bearing around the steel shaft, and terminating at the other end in a 12 x 12-in. platform, is free to swing back and forth. The platform at one end for supporting the ladle, a hollow frame filled with sand, holds the ladle in position under the spout until it is filled with metal. The ladle is carried away and replaced by another, or by the first ladle after the contents have been poured.



Steel shaft that supports the revolving arm is bedded in concrete

When and if it is necessary to place a crane ladle under the spout, the arm and platform are swung out of the way. The height of the arm and platform above the floor may be regulated by raising or lowering a collar attached to the steel shaft by one or two set screws.

Casting Shows Excessive Wear

QUESTION We would like your comments relative to a wear problem we are encountering. It concerns a pearlitic malleable casting with a brinell range of 187 to 212 which is ground parallel on two faces, and placed between two 1085 steel plates hardened to 363 to 415. Assembly is held together with springs against the plates and a bolt through the whole. Pressure is set up with a torque wrench applied to the bolt. A tight scale is present on the plates.

Our trouble is that the pearlitic casting wears excessively on one face (as much as $\frac{3}{8}$-in.) while the other shows negligible wear. Examination under the microscope shows normal pearlitic malleable matrix on the unaffected face while on the other there is evidence of slip bands and impregnation of foreign material, and indications of application of excessive force.

ANSWER Possibly in discussing your wear problem it might be pointed out that if the wear is much greater on one side than the other (assuming it is the same side in all cases) there must be some restraining influence on the side with the lesser wear that prevents movement of the steel plate in relation to the casting. You mention that the assembly is held together with springs and a bolt. It is quite possible that although the pressure is set up by a torque wrench, it is not equal on both sides due to a difference in compressibility of the springs.

While we do not know definitely, it would be our opinion that the more compressible (weaker) spring would permit movement while the less compressible (stronger) spring would not. However, the only way to determine this would be to set up assemblies with springs of equal and unequal compressibility, and note the effect on wear. Compressibility can be determined by applying loads and measuring the amount of compression. The movement between parts need not necessarily be great to cause wear since closely fitting parts subject to vibration suffer a type of surface failure known as "fretting."

Another possibility might be in the plate surfaces—either due to the scale being rough so that it imbeds in the softer casting, or in not being flat so that they tend to engage in spots. Only trouble

ANSWERS

with that premise is that it might occur only with one plate, and on either side, or with both. Hence, we suspect unequal spring pressure, or perhaps some fixture, enclosure, etc., which prevents movements on one side and not the other.

With the large differences in hardness of the plates and casting, one would expect the casting (softer) to wear in preference to the plates, and if the plates are rough the wear would be accentuated—particularly if the scale, for example, is not uniformly adherent. Possibly the amount of wear could be reduced appreciably by lubrication between plates and casting, using graphite or molybdenum disulphide.

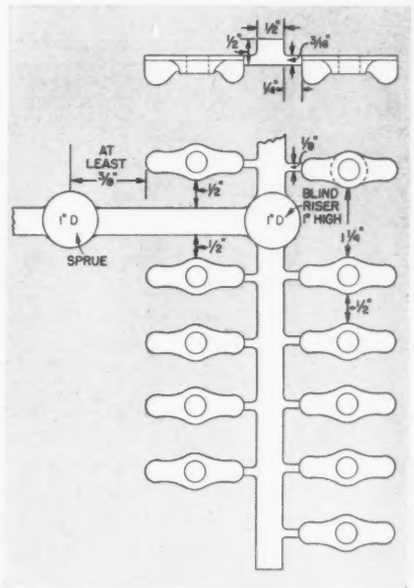
However, we believe that it would be better to surface harden the castings by flame hardening and quenching, up to or even higher than the plates, to provide equal or less wear. That, of course, involves expense as well as experimental work to determine the most suitable hardness level—and possibly equipment to perform the hardening economically and expeditiously.

Arrange Gating for Wing Nuts

QUESTION We read "Questions and Answers" each month and have obtained some good suggestions and ideas therefrom. Now we have a problem on which we hope you can give us some help. We are working on an order for ⅜-in. brass wing nuts and although we have tried several times we have no success in getting them to run. We have tried gating from the center and from the end, but still they do not run properly, and we are getting only a small percentage of good pieces. Pattern for the wing nuts is mounted on a board, 36 pieces to the board.

ANSWER Unfortunately, in your inquiry you failed to mention just how the wing nut patterns are laid out, but we gather from your remarks relative to gating from the center and from the end that you have two runners, each containing 18 nuts. Hence, in the accompanying sketch we are giving our conception of a good gating procedure.

You will note that we have



One quadrant of a gating system for producing 36 small castings

placed the wing nuts in the drag with the ears down and the runner mainly in the cope. Also, extremely short gates are used from runner to casting cavity which should insure proper feeding. Nuts are placed with the longest dimension perpendicular to the runner to obtain a straight flow as well as to provide a compact arrangement.

Wants Data on Strainer Cores

QUESTION In our foundry in England we are in the process of completely mechanizing it. We intend to use strainer cores throughout, but we have not had a great deal of success as yet. We believe there is some connection between type of core and size and section of the castings, and thought that you might have some information. What we would like are data on diameter and number of holes in the strainer core in relation to size of the down runners and ingates. Also the position of the cores in relation to the pattern and depth of the cup over the cores.

ANSWER Brief search of the literature does not disclose whether anyone has determined a relationship between the area of the holes and the sprue size. Brisbois and Cartwright, *Transactions,* American Foundrymen's Society, 1938, mention the use of strainer cores from 2 to 10 in. in diam, stating that they range from ½ to 2 in. thick, and that the number and size of the holes varies according to the job, and usually contain from 4 to 12 holes of ¼ to ½-in. in diam.

Ceramic strainer cores are available from several makers. Standard sizes contain 5 to 16 holes that give an equivalent gate or sprue cross-sectional areas from about 0.5 to 1½ sq in. Rough determination of the hole-total area relationship indicates that the hole area ranges from 10 to 22 per cent. Using a 2-in. core with four ¼-in. holes as described by Brisbois and Cartwright, the area of the holes is about 15.6 per cent. Selection of the strainer core is based on the rate of metal delivery desired.

Circular strainer cores of course, are designed for placement in the sprue, but there seems to be no rhyme or reason as to any specific point. Some foundrymen locate them at the bottom of the sprue, others about half way down, and still others place them at the top of the sprue, using a pouring cup. It also should be pointed out that strainer cores also may be made in square or rectangular form and placed along some point in the runner, usually close to the gate or ingress to the casting. Part of the runner at that point is depressed

QUESTIONS ? ANSWERS

to permit insertion of the core and to allow the metal to enter the cavity.

Spray With Volatile Carrier

QUESTION We are interested in a proprietary material which we believe is an alcohol-base spray that may be ignited after placing on the mold face to provide a skin-dried surface. Can you supply any information on it?

ANSWER Material you mention is not familar to us but, as you indicate, may be an alcohol-base mold spray. Use of mold sprays involving a volatile vehicle is not new, but we believe it is not practiced to any great extent due to the hazard involved with inflammable agents In this country mold faces sometimes were sprayed with gasoline and then ignited. However, we understand that the skin drying effect hardly was deep enough to make it worthwhile, not to mention the danger of fire or explosion.

In *Foundry Trade Journal* (London), Jan. 14, 1943 issue, Walker describes an alcohol-base spray which he claimed was successful. He used a proprietary mold wash containing dextrine, silica flour and bentonite which he mixed with shellac and alcohol plus additional bentonite. As he describes it, he makes a thick shellac and adds one part of it to 20 of alcohol. To one quart of the shellac-alcohol mixture he adds 2 lb of the mold wash and ¼-lb bentonite.

Possibly you could use ethyl silicate which, prepared for use, has considerable alcohol in the mixture. Air-drying mold washes, we understand, use gasoline with sufficient carbon tetrachloride to reduce its inflammable characteristics.

Stamp Letters on Mold Face

QUESTION We shall appreciate information on a method for casting letters on a swept-up mold baked hard. We have been putting on letters with a die pressed into the mold. The impression is hard to make and the letters do not come out very well.

ANSWER If you mean you try to make the letter impression *after* the mold is baked, we are not surprised to learn the result is unsatisfactory. Several methods are practiced for producing letters, numbers or insignia of any kind on the face of a casting. In the majority of instances the work is done while the mold is green and comparatively soft.

1. The desired letters are attached to a piece of thin, flat wood or metal, leaving a 1-in. margin outside the letters at the ends and sides. The device is held against the face of the mold and tapped lightly with a hammer until the flat margin of the device coincides with the mold face. This part of the job can be done either before or after the mold face is covered with facing material. Where the face of the mold is to be covered with blacking applied by a spray gun, the letter impression may be done before the spray is applied.

If the blacking is applied with a brush or swab, the technique is slightly different. After the blacking is applied, a piece of thin oiled paper is laid over the anticipated letter area. Then the board with attached letters is tapped into place as in the first instance. Alternatively, instead of using the paper, the letters and face of the board may be oiled. In both instances the purpose is to prevent the sand or blacking from sticking to the device. The foregoing applies to a straight, flat face. If the mold is swept, as in your case, the backing wood, or piece of plate, is bent to the same curve as the mold face.

2. Letters are mounted in the desired position on the bottom of a shallow corebox. The core is turned out on a plate and then dried until it is sufficiently firm to handle. If a pattern is employed to form the mold, a core print the same thickness as the core is attached to the pattern. Where the mold is swept, a core print is bedded in the desired position on the face of the mold. In either case the core is placed in the core print and the sand is tucked in and smoothed around the edges before the blacking is applied. In some instances where the anticipated temperature of the oven is unusually high, the core is not placed in the core print until after the mold is dried. However, in the majority of instances the core is placed and the edges finished in a more satisfactory manner while the mold is still green.

3. Letters or other inscription on bell molds are formed by several methods depending on whether a pattern is employed, the mold is swept in sand, swept in loam, or formed by the lost wax method.

When a pattern is employed, the letters are attached by finishing nails. When the cope sand is rammed high enough to hold the

(*Concluded on page* 132)

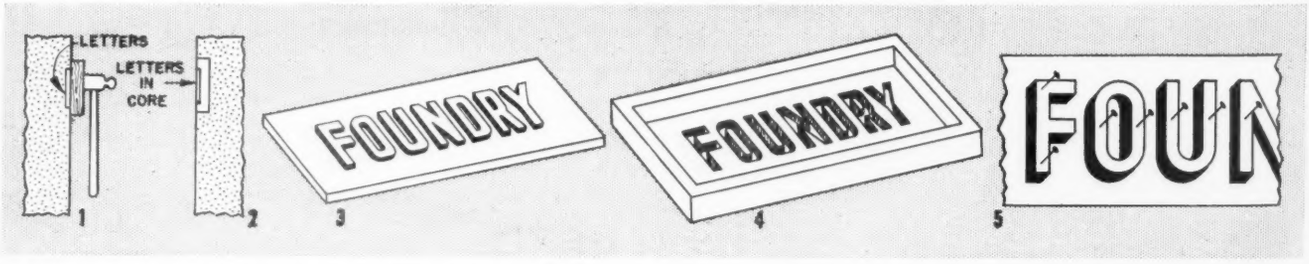


Fig. 1—Raised letters fastened on board. Fig. 2—Letters in core face. Fig. 3—Letters mounted on a board for stamping. Fig. 4—Letters located in corebox. Fig. 5—Letters pinned on pattern or mold face

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of prepared sand per hour

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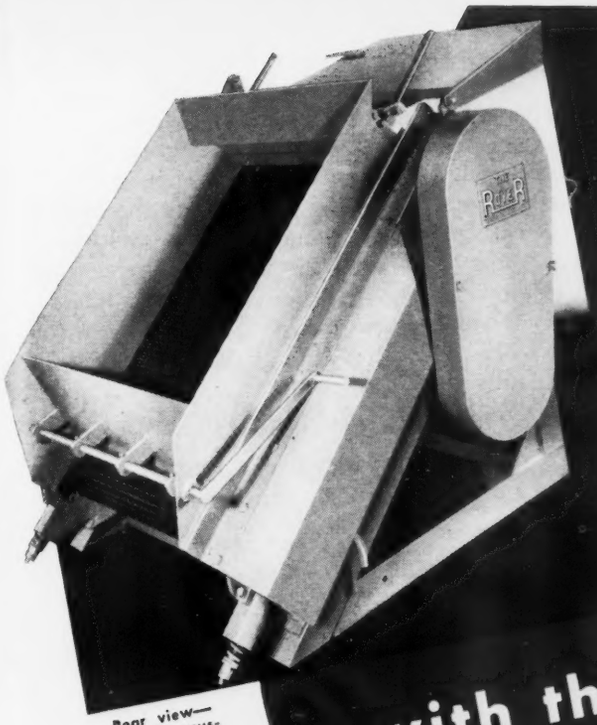
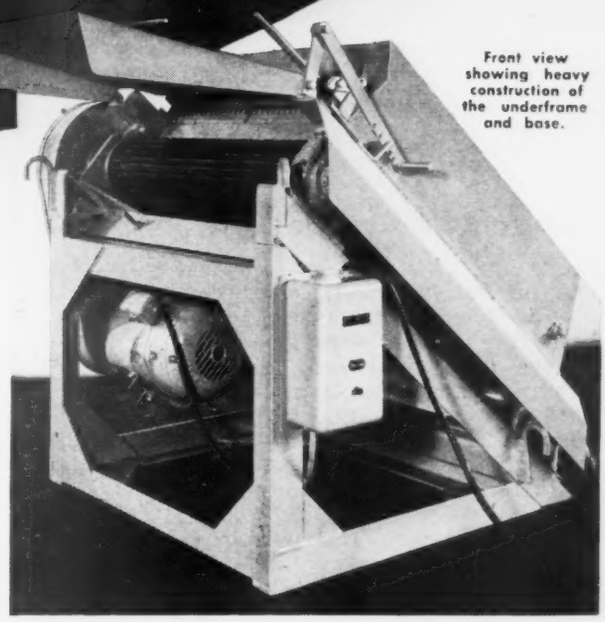


Rear view—note the unusual expanse of the hopper and combing belt.



Front view showing heavy construction of the underframe and base.

Foundries that have a conditioned sand requirement of 60 tons per hour or more find the new Royer "NYS" ideally suited to their needs. This newest model in the complete Royer line of sand separators and blenders has a capacity of 60 to 100 tons of prepared sand per hour, depending upon the type and temper of the sand.

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Unusually sturdy construction is your assurance of long service life under abusive operating conditions. Investigate the possibilities for this production increasing machine in your foundry. Write today for more information on this labor saving unit.

SPECIFICATIONS

Capacity	60 to 100 tons per hour depending upon type and temper of sand	
Overall Dimensions	Length:	54"
	Width:	56"
	Height:	54"
	Belt Width:	36"
Approximate Weight		2000 pounds
Power		15 horsepower
Construction	Heavy welded angle frame and base	

Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

QUESTIONS ANSWERS

(*Concluded from page* 130)

letters in place, the pins are withdrawn. The letters therefore come with the cope when it is lifted, and may be removed readily. The same procedure is followed when the mold is made by first sweeping the core, building on a thickness equal to the specified metal thickness and then ramming the cope against this coating.

This procedure, of course, does not apply where the drag is swept over one casing and the cope is swept in a second casing. In this instance the letters are pressed into the cope face in the manner described in No. 1. Incidentally, the two special casing rigging and method is the most widely used method among the bell makers.

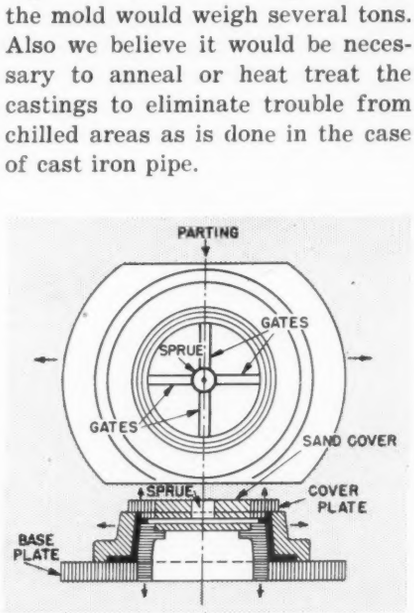
In the lost wax method the pattern is wax and the letters, formed of the same material, readily are attached in the desired position on the main pattern.

Permanent Mold for Manholes

QUESTION It has been our pleasure to read FOUNDRY and think it is tops in foundry information. We have consulted it on various occasions and have found the information very reliable and practical. However, we are experimenting with a new type of mold and making little progress due to lack of knowledge and information. What we have in mind is a permanent mold for all or part of a manhole casting, and will appreciate any and all information you can send us on permanent molds. We would like to start with a pattern from scratch and follow it through the various stages.

ANSWER As you mention, there is not much information available on the details of developing a suitable permanent mold, since most of the practice is based on experience and skill. We believe you will save yourself considerable grief by placing your problem in the hands of some firm engaging commercially in permanent mold design and production.

Your reference to manhole castings, we assume, means those used on top of sewer openings or underground chambers for telephone and power lines. Making a permanent mold for such a casting is rather a large undertaking, and we doubt that it would produce castings any cheaper than by usual methods. The mold would be a rather ponderous affair since the usual rule-o-thumb of a mold thickness of 2½ to 3 times casting section would not give sufficient rigidity and protection against warping or twisting. It would be our guess that the mold would weigh several tons. Also we believe it would be necessary to anneal or heat treat the castings to eliminate trouble from chilled areas as is done in the case of cast iron pipe.



Sketch showing arrangement of permanent mold for manholes

If the manhole casting or curb is similar to that shown in the accompanying sketch, either without ribs or with four equally spaced, you might be able to use a multipart mold as indicated. It is composed of a base plate with an open center to lighten it, a cover plate also open center for the same reason, two movable side sections, and a hollow movable center core. We believe that such a core is necessary to permit the casting to contract without cracking, and, of course, it would be dropped down as soon as the metal has solidified sufficiently. The time would have to be based on metal and mold temperature after experiment. Possibly instead of a metal core, you could make it of core sand in the form of a ring or rather a truncated cone a few inches thick.

Pouring is through a core located in the center of the opening in the cover plate. Core may be solid, but more economically consists of a center pouring cup with four branches leading into the upper inside flange of the casting. Of course, in the interest of saving floor space, the mold might be stood on edge, and poured through a slot gate at the upper mold joint.

Cores May Have To Be Coated

QUESTION Would you suggest a suitable core mixture for cores ranging from 1 to 5 in. in diam, and 14 in. long? These are for brass castings. Our present mixture tends to burn-in.

ANSWER If the cores you are making are being used for phosphor-bronze, it will be necessary to employ a coating of some type to prevent your present trouble since that type of alloy is quite "fluid," and tends to penetrate even quite small openings. Many suitable core coating materials are available on the market, or you could try a thin mixture of graphite and molasses water. If the cores are for red brass, possibly more than the usual amount of phosphor-copper (2 oz per 100) for deoxidation is being used.

Possibly the sand you are using is too coarse, resulting in large surface voids into which the metal can creep. You could try closing it up by adding some fine molding sand, fine silica sand or silica flour. You do not mention whether the burn-in applies to all sizes of cores or to the small or large ones. If you are baking all sizes of cores for the same length of time and at the same temperature, you will have trouble since you will have either underbaked or overbaked cores depending upon whether the time cycle is based on the smaller or larger ones.

Cores which are underbaked or overbaked will permit metal penetration. With the underbaked cores the excessive amount of gases reacts with the molten metal to cause hot spots, while with overbaked cores the surface tends to collapse too soon and permit the metal to enter.

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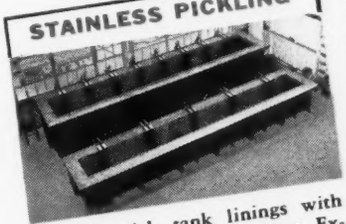

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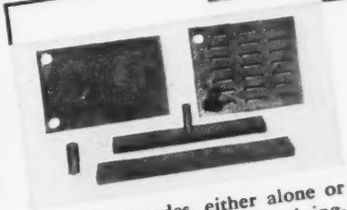
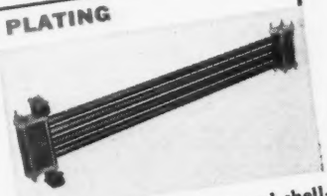


Graphite Anodes, either alone or in combination with dissolving-type anodes, are non-contaminating and long lasting.



Various immersion-type and shell-and-tube type "Karbate" Heat Exchangers are available to suit capacity requirements.

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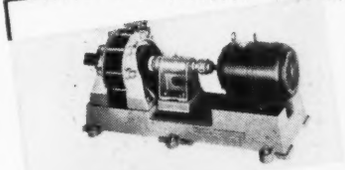

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MEN of Industry

JOHN F. SMITH, general superintendent Chevrolet Grey Iron Foundry, Saginaw, Mich., has been named plant manager, succeeding **Carl C. Wood,** retired. Mr. Smith, who joined the gray iron foundry in 1925, attended New York University and has taken various management courses at General Motors Institute of Technology in Flint, Mich. He is a former chairman of the Saginaw Valley Chapter of the American Foundrymen's Society. Mr. Wood was a veteran patternmaker in Lansing, Mich., and worked in the purchasing department of Olds Motor Works until 1925, when he joined GMC's Saginaw Products Division, later absorbed by Chevrolet. He became general superintendent in 1936 and plant manager in 1949.

♦ ♦ ♦

James H. Lowe has been named product development director, Steel Founders' Society of America, Cleveland. Following his graduation from the University of Wisconsin, Mr. Lowe joined the engineering staff of E. I. duPont de Nemours & Co., Wilmington, Del., where he became technical supervisor of its military explosives division. Until his recent appointment with the Steel Founders' Society he was technical and research director, Wehr Steel Co., Milwaukee, in charge of quality and statistical control of plant operations, sand operations, and metallurgical developments concerning armor and the Wehr plant training program.

♦ ♦ ♦

Adm. A. G. Noble, USN, retired, has been named executive vice president, a member of the executive committee and a director, Nordberg Mfg. Co., Milwaukee. Admiral Noble was graduated from the Naval Academy and received a master's degree in mechanical engineering from Massachusetts Institute of Technology in 1923. He served in the Naval Department as Chief of the Bureau of Ordnance and Chief of Naval Materiel. Since his retirement from the Navy in 1951 he has been vice president-general manager, Martin-Parry Corp., Toledo, O.

♦ ♦ ♦

Frank R. Heaton, formerly associated with Detroit Steel Casting Co., Detroit, recently acquired Howell Casting Co., Howell, Mich., which he is operating under that name, producing sand and permanent mold castings of aluminum and copper-base alloy.

♦ ♦ ♦

J. L. Adams has been named assistant to the president, Bohn Aluminum & Brass Corp., Detroit. **Raymond C. McCullough** has succeeded Mr. Adams as divisional sales manager with headquarters in Detroit, and **Richard C. Aylward,** formerly sales representative, has been made Chicago office manager to fill the vacancy created by Mr. McCullough's promotion. Mr. Adams joined the company in 1946, following Marine Corps service in World War II. Mr. McCullough was associated with Reynolds Metals Co., Louisville, and Kaiser Aluminum & Chemical Sales Corp., Oakland, Calif., prior to 1949 when he joined Bohn Aluminum.

♦ ♦ ♦

Katherine T. Young has been elected president, Centre Foundry & Machine Co., Wheeling, W. Va., and **Martin T. Manion,** executive vice president and general manager, to fill the vacancy caused by the death of J. Harold Young, who had been president and general manager. **M. C. McCluskey** has been named secretary-treasurer.

♦ ♦ ♦

Dr. Maurice J. Day has been named manager, materials and processes division, Armour Research Foundation, Illinois Institute of Technology. Dr.

(Continued on page 136)

JOHN F. SMITH
. . . Chevrolet plant mgr.

CARL C. WOOD
. . . retires from Chevrolet

JAMES H. LOWE
. . . joins SFSA staff

ADM. A. G. NOBLE, USN
. . . Nordberg executive

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aluminum
magnesium
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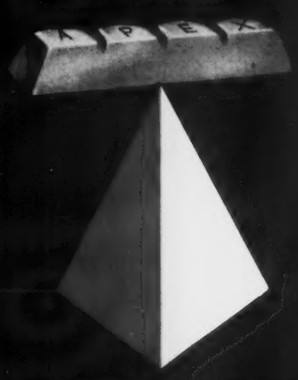
symbol of quality



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MEN of Industry

(*Continued from page* 134)

Day was formerly a metallurgical engineer in the Pittsburgh plant of U. S. Steel Co.

♦ ♦ ♦

Richard H. Shurmer has been appointed sand technician and foundry engineer, the Hydro-Blast Corp., Chicago. Following graduation from Ohio State University, Mr. Shurmer spent 4 years with Ferro Machine & Foundry Inc., Cleveland, as sand control supervisor. For the past year he has been foundry engineer, Richmond Foundry & Mfg. Co., Richmond, Va.

♦ ♦ ♦

W. E. Jones has been named general manager, Wedgeplug Valve Co., New Orleans. Mr. Jones was formerly chief engineer, Stockham Valves & Fittings Inc., Birmingham, which recently acquired the valve company.

♦ ♦ ♦

E. Claude Jeter, manager of Ford Motor Co.'s Cleveland foundry, has been elected chairman of the company's community relations committee there, which co-ordinates activities of Ford plants and offices in matters of community interest.

♦ ♦ ♦

Harry C. Martin has been elected a vice president of the Carborundum Co., Niagara Falls, N. Y., where he will continue as director of research and development. Mr. Martin was graduated from University of Toronto and joined Carborundum's research laboratory in 1913. He became assistant technical director in 1944 and technical director three years later.

ROBERT W. CROZIER
. . . Electromet regional mgr.

HERMAN J. PFEIFER
. . . Electromet sales, Houston

Robert W. Crozier has been appointed regional manager in charge of the Pittsburgh and Cleveland offices, Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York. Mr. Crozier, who joined the Electromet organization in 1934, spent 7 years in the ferroalloy plant in Alloy, W. Va., and 9 years at the Sheffield, Ala., plant, where he became assistant superintendent in 1944. In 1950 he was transferred to the Pittsburgh sales office and last year was named assistant division manager for the Pittsburgh-Cleveland sales area. **Herman J. Pfeifer** has been named district manager of a new Electromet sales office recently opened in Houston, Tex. Mr. Pfeifer, who has been with the company 15 years, spent a short time at the ferroalloy plant in Niagara Falls, N. Y., and was then transferred to Chicago sales.

♦ ♦ ♦

Kenneth H. Priestley, elected chairman of the Saginaw Valley Chapter of the American Foundrymen's Society for 1952-53, is president and chief metallurgist of Vassar Electroloy Products Inc., Vassar, Mich. Mr. Priestley, a native of Adrian, Mich., was graduated from Michigan State College in 1934, when he became chief metallurgist, Eaton Mfg. Co., Foundry Division, in Vassar. He left Eaton in 1946 to establish his own company which produces specialty ferrous alloys and castings. Mr. Priestley was vice chairman of Saginaw Valley Chapter last year and has been active in national committee work of the AFS.

♦ ♦ ♦

George F. Pettinos Sr., president, George F. Pettinos Inc., Philadelphia, recently observed his 90th birthday by continuing as active head of the company which he organized in 1892 to supply the metalworking industry with industrial sands, gravel and graphite products. Mr. Pettinos, a native of San Francisco, attended Dickinson College and was graduated from Lehigh University in 1887. He was associated with Bethlehem Steel Co. for 5 years prior to forming his own company. He is also president of Bridgeton Sand Co., Cape May Sand & Gravel Co., Reading Sand Co., A. T. Harris Sand Co., Pettinos New England Inc., all engaged in production of industrial sand, and president of George F. Pettinos (Canada) Ltd., a Canadian subsidiary. Mr. Pettinos was one of the first members of the Philadelphia Foundrymen's Association and the American Foundrymen's Society. George F. Pettinos Jr., his son, is engaged in business with him.

♦ ♦ ♦

Nils C. Johanson has been appointed resident demonstrator in the Cleveland area for the Grinding Machine Division, Norton Co., Worcester, Mass., succeeding **Alfred C. Womer** who has

(*Continued on page* 138)

HARRY C. MARTIN
. . . Carborundum vice pres.

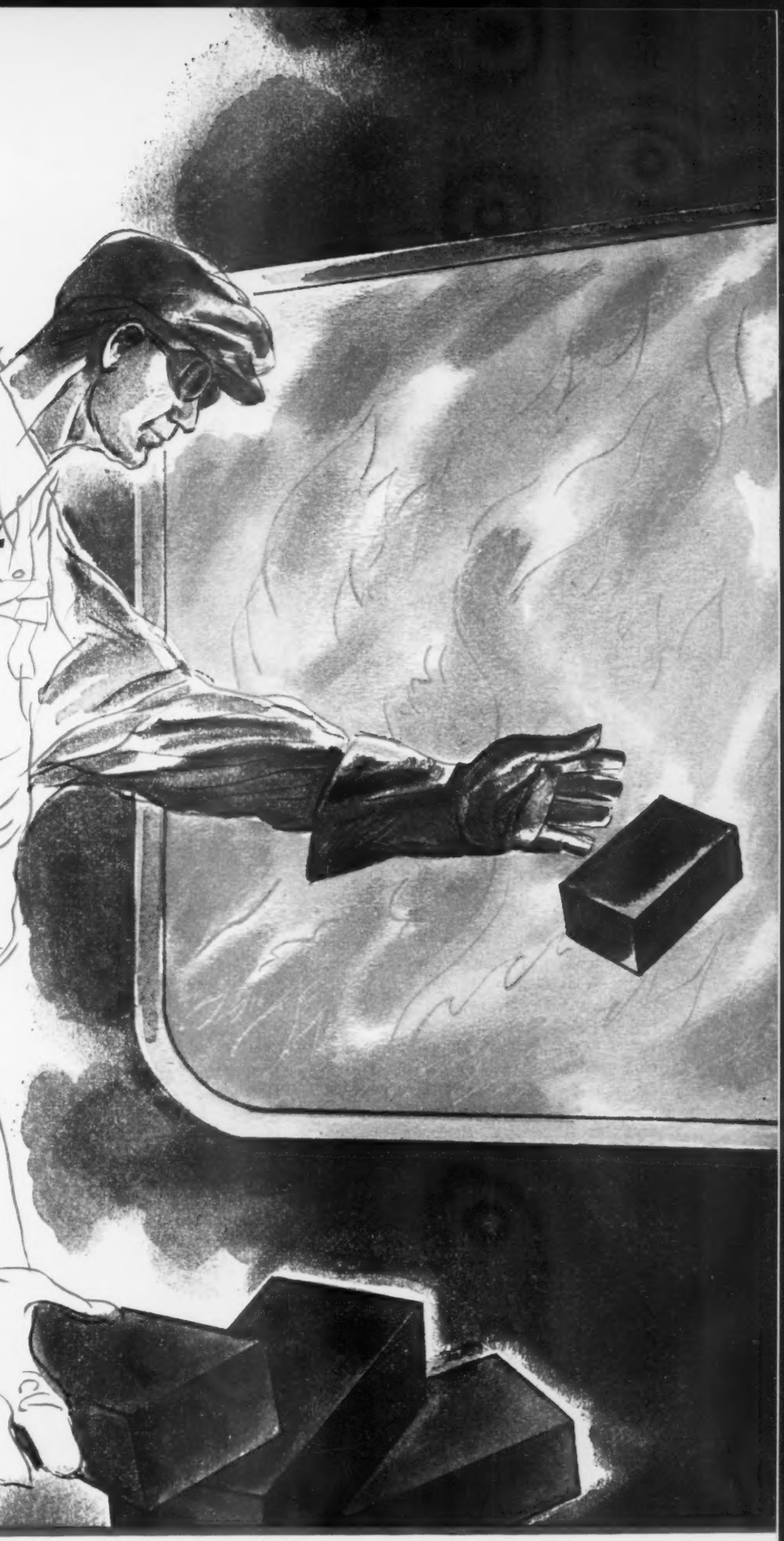
KENNETH H. PRIESTLEY
. . . AFS Chapter Chairman

PIG IRON SUPPLY TIGHT?

THEN SWITCH TO

MEXITE® BRIQUETTES

FOR CARBON CONTROL IN THE CUPOLA



Replace carbon usually provided by pig iron. Supply a uniform steady source of graphitic carbon. Enable better castings to be poured from 100% scrap charges. Raise carbon, thus reducing chill, shrinkage and hardness . . . increase fluidity and machinability. Easy to use.

139-A

THE UNITED STATES GRAPHITE COMPANY

Division of The Wickes Corporation • Saginaw, Michigan

MEN of Industry

(*Continued from page* 136)

been transferred to the company's Abrasive Division. Mr. Johanson was formerly in the erecting department in Worcester.

♦ ♦ ♦

John H. Owen, elected president of the Chicago Chapter of the AFS for 1952-53, is Chicago district sales manager, Harbison-Walker Refractories Co., Pittsburgh. A native of Plainfield, N. J., Mr. Owen attended Washington University, St. Louis, where he was associated with the

JOHN H. OWEN
. . . heads Chicago Chapter

C. W. HAWLEY
. . . equipment sales

LESTER L. GROOMS
. . . Jeffrey sales mgr.

DANIEL W. TALBOTT
. . . eastern sales, Duraloy Co.

former Independent Foundry Supply Co., now the M. A. Bell Co., St. Louis. He joined Walsh Fire Clay Products Co. in 1925, and when that company was acquired by Harbison-Walker Refractories Co. in 1927 he remained with the company and was sent to Chicago a year later as a salesman in warehouse trade. In 1946 he became assistant district sales manager, and he has been district sales manager since 1948. Mr. Owen was chapter vice president last year.

♦ ♦ ♦

August R. Ryan has been named manager of furnace sales and associated equipment, industrial heating department, General Electric Co., Schenectady, N. Y. Mr. Ryan, a graduate of Washington University, joined the company as a test engineer in 1927. Following developmental work in the Pittsfield, Mass., laboratory, he spent a year in the industrial heating department and 5 years in the industrial engineering department. Since 1935 he has been in the industrial heating department working in sales and application engineering.

♦ ♦ ♦

Richard S. Stockwell has been appointed sales and service representative in the Minneapolis-St. Paul territory, with headquarters in St. Paul, for Lewis-Shepard Products Inc. **Raymond F. Purinton** will represent the materials handling supply company in Denver, and will cover Colorado, Wyoming and part of southwestern Nebraska.

♦ ♦ ♦

C. W. Hawley, formerly sales manager of the Products Engineering Division, the Jeffrey Mfg. Co., Columbus, O., has been named manager of original equipment sales, Merchandise Division. Mr. Hawley, a graduate of Yale University, recently returned from six months in Washington with NPA as chief of the Conveyor Section. **Lester L. Grooms,** who joined the company in 1916, has succeeded Mr. Hawley as sales manager of products engineering. He spent a year and a half in the Cleveland office and until recently was engineer of the Chain Sales Division with headquarters in Columbus.

♦ ♦ ♦

Russel T. Drennan and **Joseph A. Voss Jr.** have been appointed sales managers in eastern districts of the Chemical Division, Kaiser Aluminum & Chemical Sales Inc., with headquarters at the division's general sales offices, Akron, O. Mr. Drennan, a graduate of McKendree College of Lebanon, Ill., will supervise sales and development along the Atlantic seaboard, of basic refractory brick, mixes and mortars. He was formerly with Aluminum Co. of America, Pittsburgh and at Kaiser Aluminum's Baton Rouge, La., plant. Mr. Voss, a graduate of Case Institute of Technology, will be in charge of midwest sales, including Pittsburgh, Cleveland, Detroit and Chicago. He was formerly associated with Wisconsin Steel Co., Chicago, and Republic Steel Co., Cleveland.

♦ ♦ ♦

Walter Quayle, acting assistant plant superintendent, Cleveland Works, National Malleable & Steel Castings Co., has been named assistant to the general purchasing agent in the general office there. Mr. Quayle was graduated from Ohio Wesleyan University in 1935, when he became a trainee in National Malleable's Cleveland works. He has served as foreman, production clerk, shipping head and finishing superintendent there.

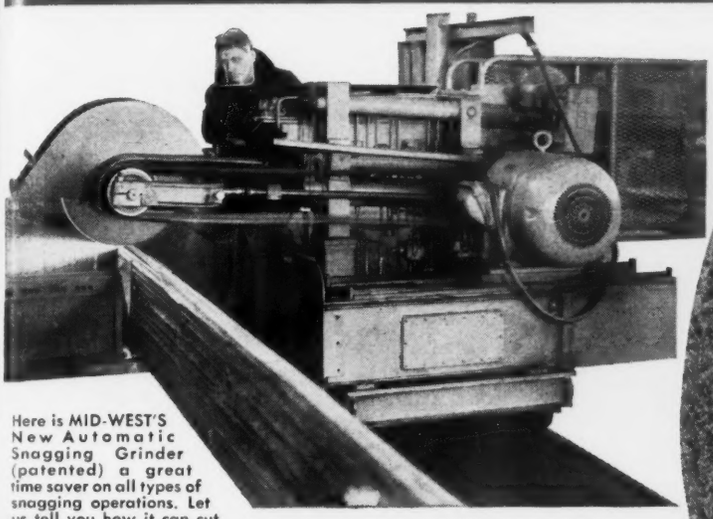
Daniel W. Talbott, until recently vice president, Cooper Alloy Foundry Co., Hillside, N. J., has been appointed to the eastern sales staff, the Duraloy Co., Scottdale, Pa., with headquarters in the New York office. Mr. Talbott was graduated from Carnegie Institute of Technology and prior to his connection with Cooper Alloy Foundry Co. was associated with Ohio Steel Foundry Co., Lima, O., and Symington-Gould Corp., Rochester, N. Y., as plant superintendent.

♦ ♦ ♦

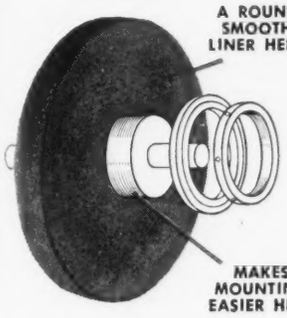
Richard E. Hanson has been appointed assistant to the Chicago general sales manager, Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif. **Wallace A. Davidson** succeeds Mr. Hanson as manager of the Kansas City, Mo., district office and **Donald F. Sheridan** has become branch representative in Wichita, Kans. Mr. Hanson joined Kaiser Aluminum in 1946 from Marsh Steel

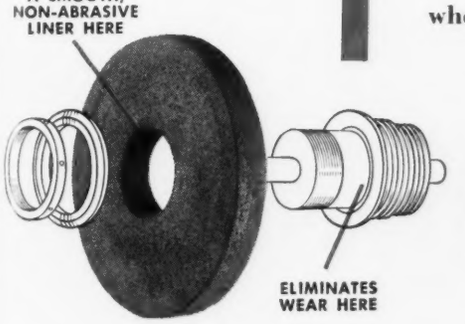
(*Continued on page* 140)

GREATER PRODUCTION...



Here is MID-WEST'S New Automatic Snagging Grinder (patented) a great time saver on all types of snagging operations. Let us tell you how it can cut costs on your grinding jobs.





... that's what you get when you use MID-WEST'S Fiber-Cushioned Snagging Wheels.

... and here are the reasons why they are better "on the job" wheels.

- **easier to mount.**
- **easier on your operator.**
- **easier on your spindle and bearings.**
- **easier on your work piece.**

Not only will Mid-West Fiber-Cushioned resinoid snagging wheels minimize the troubles so characteristic of snagging operations, but they're easier to mount, they're stronger, and they last longer.

The fiber-cushioned centers plus Mid-West's special resinoid bond, an extremely cool cutting bond, assures a highly satisfactory wheel life and increased production.

For complete information on these Fiber-Cushioned snagging wheels, write, wire or phone today.

MID-WEST ABRASIVES

Executive Offices: 510 South Washington Street, Owosso, Michigan
Plants in Owosso, Michigan and Rochester, Pennsylvania

(*Continued from page* 138)

Corp., Kansas City. Mr. Davidson, previously Wichita branch representative, was assistant project planner for McDonnell Air-Craft Corp., St. Louis, before joining Kaiser in 1950. Mr. Sheridan was in military service prior to his appointment as sales engineer with the Kansas City office in 1947.

♦ ♦ ♦

William B. Lewis Jr. has been named West coast sales representative, Bohn Aluminum & Brass Corp., Detroit with headquarters in Torrance, Calif., where he has been an industrial arts instructor in the school system there.

♦ ♦ ♦

H. S. Newhall, manager the Electrothermic Division, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, left recently on a round-the-world trip to visit installations of the company's smelting, refining and melting furnaces in Europe, Pakistan and Japan.

♦ ♦ ♦

Henry M. Clouse has been named an assistant engineer in the foundries and pattern shops, Allis-Chalmers Mfg. Co., Milwaukee, following completion of the company's graduate training course. Mr. Clouse joined Allis-Chalmers in 1950 after graduating from University of Pittsburgh.

♦ ♦ ♦

Samuel S. Auchincloss has been named executive vice president, DeWalt Inc., Lancaster, Pa., subsidiary of American Machine & Foundry Co., New York. Mr. Auchincloss was graduated from Massachusetts Institute of Technology and joined American Machine & Foundry Co. in 1946 as divisional vice president of the company's Pinspotters Division with headquarters in Buffalo. Recently he had been director of operations of its Colorado Springs, Colo., plant.

A. B. CRAWFORD
. . . NPA specialist

THOMAS S. McEWAN
. . . joins Lester B. Knight

A. B. Crawford, manager railway sales, Continental Foundry & Machine Co., Pittsburgh, is on leave from that company and is acting as an industrial specialist with the Castings Section, NPA, Washington, where he will concentrate on production of heavy castings.

♦ ♦ ♦

Albert C. Hubbard, formerly general foundry foreman, International Heater Co., Utica, N. Y., has been appointed foundry superintendent, Three Rivers Casting Corp., Three Rivers, Mich. Mr. Hubbard was previously associated with Wizard Plow Co., Batavia, N. Y., and American Radiator & Standard Sanitary Corp., Buffalo, N. Y.

♦ ♦ ♦

Gene V. Ivanso has been appointed director of metallurgical engineering and research, Detroit Testing Laboratories, Detroit. Mr. Ivanso entered the foundry industry as an apprentice molder in Cleveland and for 16 years has been a metallurgical engineer in Detroit, associated with Bundy Tubing Co., Wyandotte Chemicals Corp., and Steel Sales Corp.

Thomas S. McEwan has been appointed a vice president, Lester B. Knight & Associates Inc., Chicago. Mr. McEwan was formerly resident manager engineer, Stevenson, Jordan & Harrison, vice president of McClure, Hadden & Ortman Inc., and a partner in Wolf Management Engineering Co., all of Chicago. In 1941-42 he was first regional director, War Production Board, Chicago.

♦ ♦ ♦

Edward L. Bohn has been appointed research consultant on furnace maintenance and construction, Mullite Refractories Co., Shelton, Conn. Mr. Bohn has been associated with the refractory materials field for many years.

♦ ♦ ♦

William J. Cannon, elected chairman of the Western Michigan Chapter of the American Foundrymen's Society for 1952-53, is secretary-treasurer of the Nugent Sand Co., Muskegon, Mich. Mr. Cannon was graduated from University of Notre Dame in 1940 and for the following

(*Continued on page* 142)

SAMUEL S. AUCHINCLOSS
. . . vice pres., DeWalt Inc.

GENE V. IVANSO
. . . metallurgical research

EDWARD L. BOHN
. . . research consultant

WILLIAM J. CANNON
. . . heads W. Michigan AFS

Laborer. 1952 MODEL

No matter how good a man may be with a hand shovel and wheelbarrow, his production is many times greater as a "PAYLOADER" pilot. What's more — both he and his boss are happier because they both make more money.

In hundreds of foundries "PAYLOADERS" have taken over unpleasant, laborious material-moving chores — saving time, cutting costs and increasing production. They scoop up, carry, dump, spread and stockpile all kinds of materials . . . lift, push . . . spot and unload box cars . . . handle sand, coal, coke, scrap, slag and ashes . . . remove snow and do many other cost-cutting jobs . . . release manpower for more productive work.

Every "PAYLOADER" is a complete Hough-built tractor-shovel *designed specifically for tractor-shovel work,* with multiple reverse speeds, large pneumatic tires and other features that insure fast, low-cost performance over floors or unpaved ground, up and down ramps, through congested areas. The "PAYLOADER" is sold by a world-wide Distributor organization with complete service facilities, and seven sizes are available from 12 cu. ft. to 1½ cu. yd. bucket capacity. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.

JOB STUDIES are available without cost or obligation. Each one is a detailed, authorized word-and-picture report of "PAYLOADER" performance in a specific plant. A request on your letterhead is all that's necessary.

PAYLOADER®

THE FRANK G. HOUGH CO. Since 1920

MEN of Industry

(*Continued from page* 140)

6 years served an apprenticeship in foundry management at the Muskegon and South Haven, Mich., plants of Campbell, Wyant & Cannon Foundry Co. In 1947, with his brother, G. W. Cannon Jr., he acquired the Nugent Sand Co. Mr. Cannon is also treasurer, the Cannon-Muskegon Co., Muskegon, Mich., a research production operation in melting high-temperature alloys, stainless steel and tool steels. He was vice chairman of Western Michigan Chapter last year.

♦ ♦ ♦

L. L. Bohan has been appointed sales representative in Southern California and Nevada for Michigan Steel Castings Co., Detroit.

♦ ♦ ♦

E. M. Durstine, recently elected chairman of the Central Ohio Chapter of the American Foundrymen's Society for 1952-53, is secretary-treasurer, Keener Sand & Clay Co., Columbus, O. Mr. Durstine joined the company in 1924, following graduation from Ohio State University. He was vice chairman of the Central Ohio Chapter last year.

♦ ♦ ♦

Carl R. Sare, formerly assistant to the president, Patterson Foundry & Machine Co., East Liverpool, O., has been elected vice president, the W. W. Sly Mfg. Co., Cleveland, where he will be engaged primarily in promotion of dust filter sales. Mr. Sare attended University of Pittsburgh and Penn State Extension College. Prior to joining Patterson Foundry he was associated with Jones & Laughlin Steel Corp., Pittsburgh.

WHITING N. SHEPARD
. . . industrial belting sales

Whiting N. Shepard has been named director of sales, Boston Woven Hose & Rubber Co., Boston, producer of industrial hose and belting. Following graduation from Williams College in 1932, Mr. Shepard spent 19 years with Libbey-Owens-Ford Glass Co., Toledo, O., where he was instrumental in the introduction and market development of urea plastics. He joined Boston Woven Hose & Rubber Co. early this year as head of plastics sales.

♦ ♦ ♦

T. H. Wickenden, vice president in charge of development and research, the International Nickel Co., New York, has been elected a member of the Welding Research Council of the Engineering Foundation for a three-year term.

♦ ♦ ♦

Eric O. Prange has been named Detroit district manager, the Claud S. Gordon Co., Chicago. Mr. Prange was graduated from Wayne University and was formerly plant and tool engineer, Michigan Steel Castings Co., Detroit.

JACK MISKE
. . . FOUNDRY editorial staff

Jack Miske recently joined the editorial staff of FOUNDRY as assistant editor. Mr. Miske, a native of Cleveland, was graduated from Cleveland College of Western Reserve University and received his master's degree from the latter university in 1947. Following three years of military service in engineering and operations and public relations with Army Air Corps, upon completion of his college work he taught English in several universities, including Wayne University and more recently at University of Michigan.

♦ ♦ ♦

P. H. Kitzens has been made regional sales representative, Foundry Flask & Equipment Co., Northville, Mich.

♦ ♦ ♦

William J. Kingsley, for the past two years assistant sales manager of the bonded products and grain division, has been named assistant general sales manager, the Carborundum Co., Niagara Falls, N. Y. Mr. Kingsley joined the company in 1922 as a

(*Concluded on page* 144)

E. M. DURSTINE
. . heads Central Ohio AFS

CARL R. SARE
. . dust filter sales

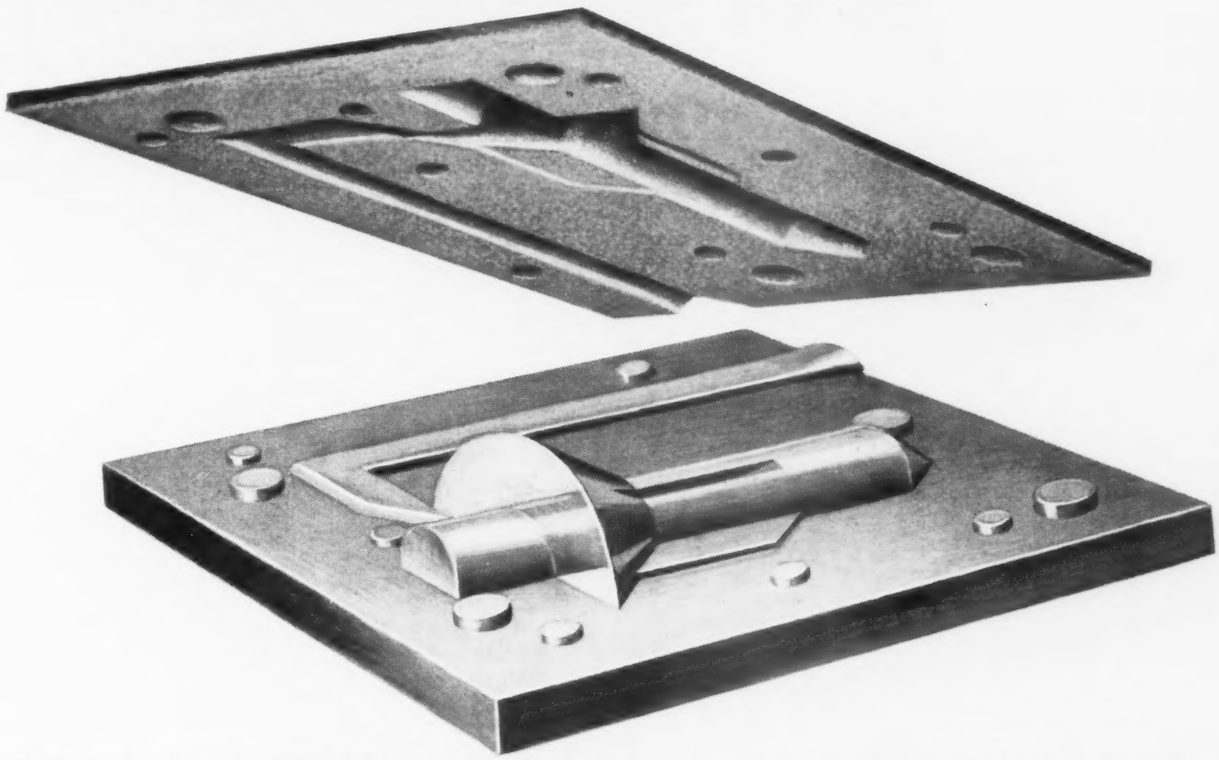
ERIC O. PRANGE
. . Claud S. Gordon sales

WILLIAM J. KINGSLEY
. . Carborundum Co. sales

GET CLOSER TOLERANCES

WITH SHELL MOLDING–

AND USE NEW G-E SHELL RESINS!



Molding by the shell method? General Electric phenolic resins, specially formulated for this new process, can help you realize the remarkable benefits it provides. Tolerances as close as .002 to .005 inches per inch are being achieved with shell molding. Castings—so clean and accurate that costly machining can be practically eliminated—are being produced.

Commercial tests at leading foundries show that the new G-E resins form strong, dimensionally accurate shells with smooth surfaces, sharp contours, and high gas permeability that help you get maximum results from the new shell process.

If you are using shell molding, or if you are thinking about using it, you'll want to investigate these new General Electric shell resins. General Electric has prepared an informative brochure telling what the new shell process can mean to you in terms of simplified molding techniques and substantial savings in metal, sand and labor. For a copy, just mail the coupon below. There's no obligation, of course.

SEND COUPON TODAY FOR MORE DETAILS

You can put your confidence in—

GENERAL ELECTRIC

General Electric Company
Section 126-4A, Chemical Division
Pittsfield, Massachusetts

Please send me a free copy of "G-E Phenolic Resins for Shell Molding Process." Include information on:

- ☐ G-E Phenolic Resin Core Binder 12353
- ☐ G-E Permafil 3255 for impregnating porous castings

Name_____

Firm_____

Street_____

City_____ Zone_____ State_____

MEN of Industry

(*Concluded from page* 142)

sales engineer and transferred to the sales department in 1936, covering the Syracuse, N. Y., area. He was previously associated with H. H. Franklin Mfg. Co., Syracuse.

♦ ♦ ♦

George L. Dirks has been appointed general manager, Blaw-Knox Division, Blaw-Knox Co., Pittsburgh, succeeding **D. V. Sherlock,** who left retirement to serve temporarily as acting general manager of the division. For the past two years Mr. Dirks has been at St. Catherines, Ont., as general manager of the Canadian division of Yale & Towne Mfg. Co., New York. Prior to that he was with the metal products manufacturing division of B. F. Goodrich Co., Akron, O.

♦ ♦ ♦

Carl Rudman has been appointed manager of agricultural sales, Indianapolis Ewart plant, Link-Belt Co., Chicago, succeeding **Kendrick M. Hickman** who has become assistant sales manager there. **H. M. Bowman,** formerly assistant sales manager at Ewart plant, has been transferred to the Pershing Road plant, Chicago, where he will be engaged in sales promotional activities. Mr. Hickman, who attended Purdue University and Illinois Institute of Technology, during 25 years with Link-Belt Co. was 3 years at the Chicago plant, 7 years in the Detroit sales office and 15 years in Indianapolis where he became manager of agricultural sales a year ago. Mr. Rudman, who attended Purdue University, joined the Link-Belt Dodge plant, Indianapolis, in 1937, and has served in the Chicago and Indianapolis sales offices.

♦ ♦ ♦

Robert M. Critchfield has been named general manager, Pontiac Motor Division, General Motors Corp., Pontiac, Mich., succeeding the late Arnold Lenz. Since January, 1951 Mr. Critchfield has been assistant general manager at the Allison Division.

♦ ♦ ♦

Edward F. Rau has been appointed sales representative, Bohn Aluminum & Brass Corp., Detroit, with headquarters in Minneapolis. Mr. Rau, who attended University of Wisconsin, was formerly associated with Manitowoc Equipment Works, Minneapolis, as service manager.

♦ ♦ ♦

George Farnham and **Jerry Melgaard** have joined the magnesium sales staff, the Dow Chemical Co., Midland, Mich. Mr. Farnham entered the metallurgical laboratories of the company last year, following graduation from Rensselaer Polytechnic Institute. He will be located in the New York office. Mr. Melgaard, who has been assigned to the Chicago sales office, was graduated from Northwestern University in 1949. He was associated with Aetna Insurance Co., Chicago, prior to joining Dow last year.

♦ ♦ ♦

Milton F. Beecher, since 1941 head of the research and development laboratories, Norton Co., Worcester, Mass., has retired. A graduate of Iowa State College, Mr. Beecher joined the ceramic section of the research department in 1915, became its chief in 1916 and research engineer in 1919. He became director of research and development in 1949, when these two departments were combined, and vice president in 1950. **Wallace L. Howe** has been named to succeed Mr. Beecher as director of research and development.

♦ ♦ ♦

E. H. Powell has been appointed assistant manager of the Richmond, Va., apparatus sales office, General Electric Co., Schenectady, N. Y. Mr. Powell, a graduate of University of Pittsburgh, joined the company in 1926 and was engaged recently in lighting sales and general sales. **L. S. Brumgard** succeeds Mr. Powell as manager of the Trenton, N. J., apparatus sales office. Mr. Brumgard, a graduate of Pennsylvania State College, joined the company in 1937.

♦ ♦ ♦

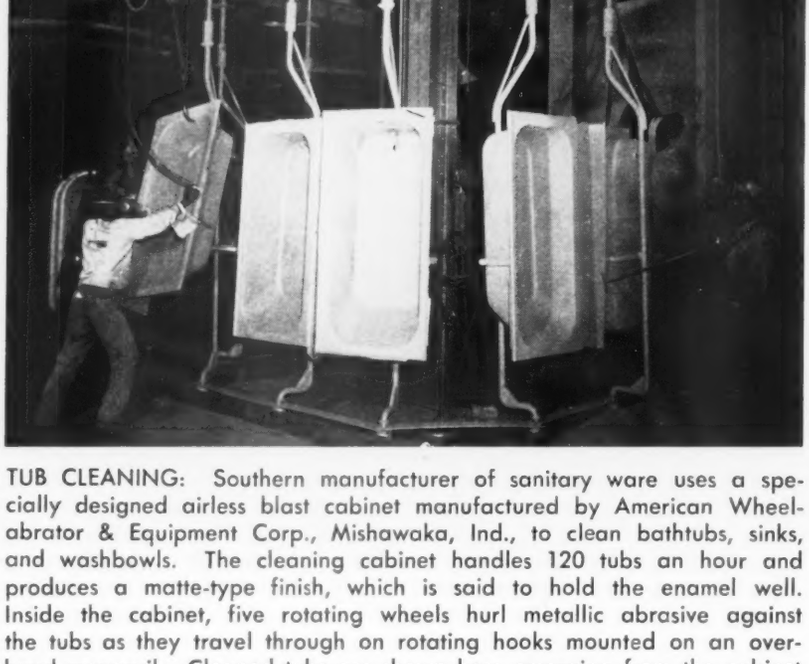
Carl Verhine, formerly in the home office of the Jeffrey Mfg. Co., Columbus, O., has been transferred to the Milwaukee sales staff. **J. A. Lowry** of the New York office has been assigned to the home office and **Elmer Longnecker** has been sent to Detroit from Columbus, succeeding **Robert Monsarrat,** who has been appointed manager of the Philadelphia district office.

♦ ♦ ♦

Frank S. Brewster has been elected vice president-general manager, Harry W. Dietert Co., Detroit, and **Douglas L. Buss,** executive vice president and treasurer. **Harry W. Dietert** continues as president and **Jess Toth,** secretary and assistant treasurer.

♦ ♦ ♦

Robert M. Kennedy succeeds **Irvin A. Brinkman,** retired, as director of employment, safety and welfare at Mackintosh-Hemphill Co., Pittsburgh. Mr. Kennedy also continues as industrial relations director.



TUB CLEANING: Southern manufacturer of sanitary ware uses a specially designed airless blast cabinet manufactured by American Wheelabrator & Equipment Corp., Mishawaka, Ind., to clean bathtubs, sinks, and washbowls. The cleaning cabinet handles 120 tubs an hour and produces a matte-type finish, which is said to hold the enamel well. Inside the cabinet, five rotating wheels hurl metallic abrasive against the tubs as they travel through on rotating hooks mounted on an overhead monorail. Cleaned tubs are shown here emerging from the cabinet

FMC's *Professors of Foundryology*

announce "MASTERMIX"

in three new paste type core & mold washes designed for foundry efficiency.

MASTERMIX NO. 1 . . . *high refractory zircon wash for steel and heavy section gray iron castings.*

MASTERMIX NO. 2 . . . *all-purpose wash for steel or heavy gray iron castings.*

MASTERMIX NO. 3 . . . *black wash for medium to light gray iron castings.*

BUY FMC

MASTER-MIX HIGH REFRACTORY AND CORE AND MOLD WASH can be sprayed, brushed or swabbed. The best results are obtained when the wash is applied to green cores, or molds, before drying. If the wash is applied as recommended, the resulting castings will have smooth surfaces with no burning-in or metal erosion. Note: too thin a coating of the wash will defeat its purpose. MASTER-MIX # 1 has a refractory value of 3450° F. It has high hot strength and high dry strength, a low expansion rate and a fast chilling rate. The higher cost of this wash is more than offset by the material savings and improved casting finish it makes possible.

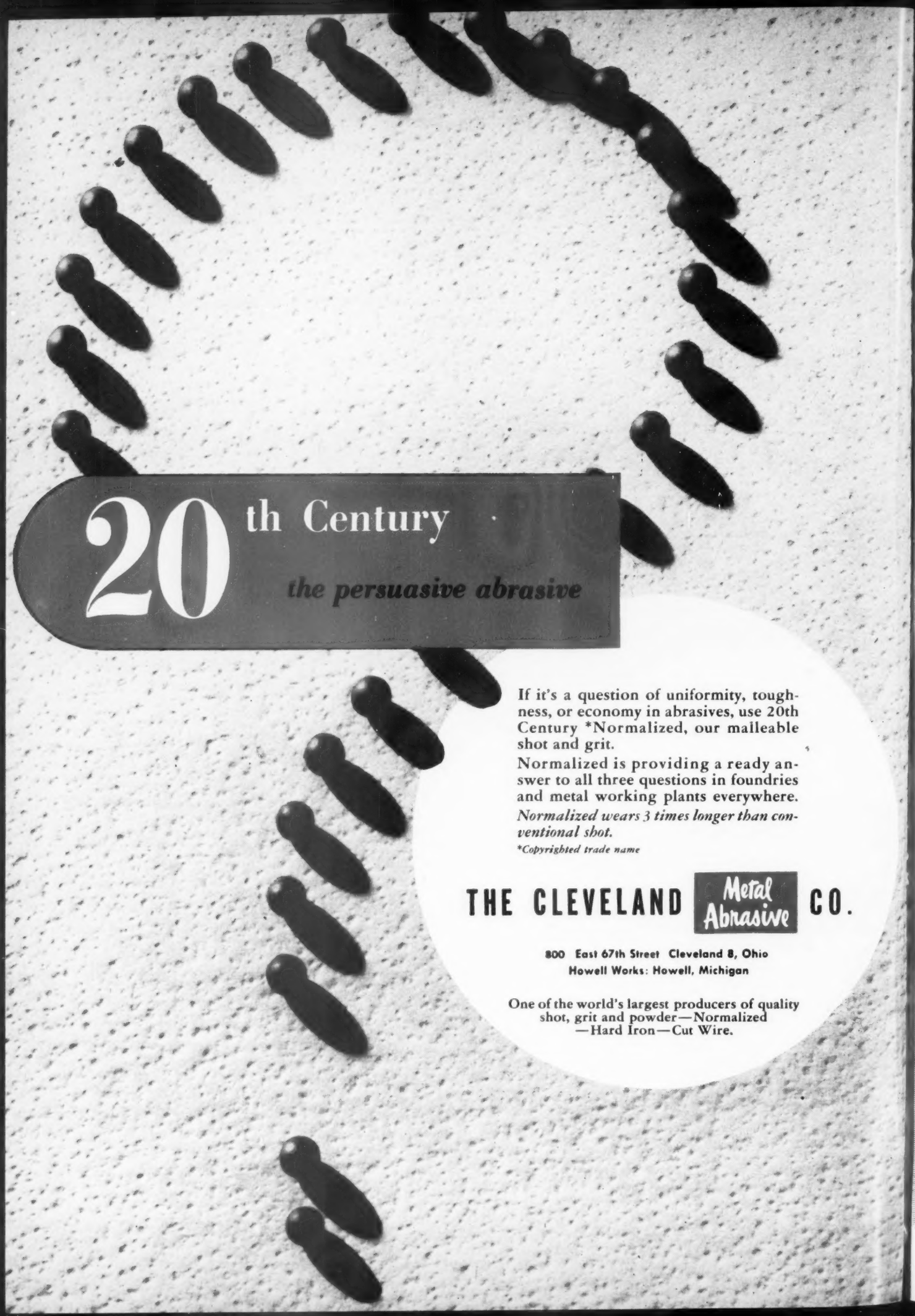
KORWELD

the new FMC *core paste development:*

Foundry laboratories claim it develops 1/2 to 2/3 less gas than anything they've ever used. These important facts are the main reasons why KORWELD is not simply another core paste. Instead of merely forming a surface weld, KORWELD grips into the actual grain, giving greater strength. KORWELD dries faster and eliminates a great part of "waiting time", which is a special advantage in production work. KORWELD increases resistance to moisture, a factor that gives added strength and safety in core storage. KORWELD helps eliminate trouble from gas formation. In fact, KORWELD is a very superior core paste. Why not take a tip from our Professor of Foundryology, and order a trial barrel today?

FOUNDRIES MATERIALS CO.

GENERAL OFFICE AND WAREHOUSE
COLDWATER, MICHIGAN
Detroit Sales Office: 3000 E. Grand Blvd.


20th Century
the persuasive abrasive
If it's a question of uniformity, toughness, or economy in abrasives, use 20th Century *Normalized, our malleable shot and grit.
Normalized is providing a ready answer to all three questions in foundries and metal working plants everywhere.
Normalized wears 3 times longer than conventional shot.
*Copyrighted trade name
THE CLEVELAND Metal Abrasive CO.
800 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan
One of the world's largest producers of quality shot, grit and powder—Normalized —Hard Iron—Cut Wire.

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	920,502	512,192	.....
1951			
June	94,376	57,176	258,144
6 mo.	577,273	347,796	.....
July	76,826	45,072	263,017
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,085,241	656,076	.....
1952			
Jan.	87,003	54,988	202,799
Feb.	82,898	50,129	193,061
Mar.	80,960	49,084	196,896
Apr.	89,270	56,337	198,215
May	81,770	51,476	180,382
June	74,446	46,511	173,353
6 mo.	496,347	308,525	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled Orders[2]
1950	1,056,973	953,590	55,614	.....
1951				
June	102,780	92,256	5,692	83,518
6 mo.	641,198	576,485	37,469	.....
July	80,036	72,147	4,321	85,837
Aug.	95,024	84,503	5,422	84,821
Sept.	89,567	79,676	5,493	84,611
Oct.	99,355	88,332	6,237	82,491
Nov.	92,102	82,270	6,043	82,667
Dec.	80,259	72,813	4,958	80,294
Total	1,177,541	1,056,226	69,943	.....
1952				
Jan.	89,616	80,376	6,233	78,316
Feb.	86,231	77,813	5,204	75,279
Mar.	88,642	79,437	6,182	72,463
Apr.	84,460	75,590	5,914	70,602
May	81,903	73,723	5,420	70,252
June	75,246	67,635	4,858	70,928
6 mo.	506,098	454,574	33,811	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Shipments—Die	Unfilled Orders[3]
1950	543,082	184,782	181,366	167,201	.....
1951					
June	44,910	17,347	13,609	13,085	110,317
6 mo.	300,892	108,680	100,509	86,693	.....
July	34,483	13,514	9,493	10,459	119,461
Aug.	45,207	17,813	14,452	11,767	117,888
Sept.	41,864	16,490	11,793	12,293	112,973
Oct.	45,419	17,694	13,495	13,049	110,382
Nov.	41,661	16,278	11,725	12,604	116,044
Dec.	40,907	16,202	11,262	10,891	110,249
Total	550,433	206,671	172,729	157,756	.....
1952					
Jan.	46,424	18,051	12,236	13,884	109,654
Feb.	44,847	17,451	13,445	13,012	110,327
Mar.	46,448	19,017	13,673	12,880	104,749
Apr.	49,824	19,451	14,631	14,482	104,004
May	47,752	18,317	14,292	13,907	100,802
June	46,721	18,404	12,018	13,824	103,529
6 mo.	282,016	110,691	80,295	81,989	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[3]
1950	15,224	13,310	.....
1951			
June	2,294	1,946	14,331
6 mo.	15,577	13,664	.....
July	2,211	1,850	15,528
Aug.	2,957	2,543	16,095
Sept.	2,551	2,306	16,407
Oct.	2,977	245	16,143
Nov.	3,946	2,954	15,550
Dec.	2,916	2,525	14,729
Total	33,135	28,596	.....
1952			
Jan.	3,569	3,083	14,047
Feb.	3,368	2,940	14,459
Mar.	3,319	2,972	13,279
Apr.	3,051	2,751	13,244
May	3,002	2,698	13,041
June	2,948	2,699	12,094
6 mo.	19,257	17,143	.....

Foundry Production Workers

Estimated Number

	June 1952	May 1952	June 1951
Gray Iron	.....	144,900	162,000
Malleable	.....	25,900	28,100
Steel	.....	67,900	63,500
Nonferrous	.....	95,000	91,100

Average Weekly Earnings

	June 1952	May 1952	June 1951
Gray Iron	$68.76	$69.01	$70.55
Malleable Iron	71.76	70.90	71.33
Steel	79.20	76.93	76.47
Nonferrous	75.79	75.05	73.09

Average Weekly Hours

	June 1952	May 1952	June 1951
Gray Iron	40.0	40.1	42.5
Malleable Iron	39.6	39.5	41.4
Steel	43.3	42.5	43.4
Nonferrous	41.1	40.7	41.6

Labor Turnover Rate (May)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.1	3.9	2.6	0.4
Malleable Iron	4.2	4.5	2.2	1.5
Steel	4.4	4.9	3.4	0.6
Nonferrous	6.6	5.4	2.6	1.0

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

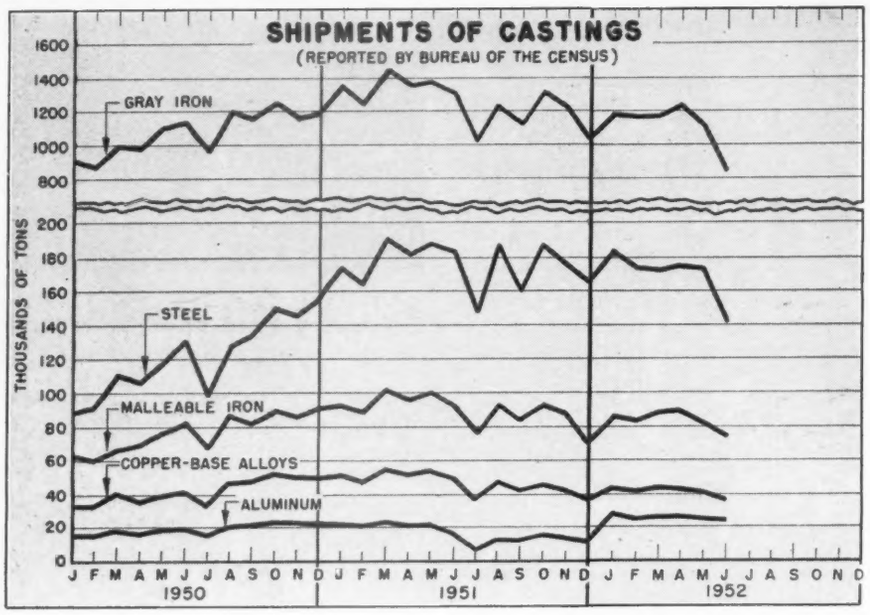
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Chilled Railroad Car Wheels—For Sale	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[3]	Unfilled Orders[3] Total
1950	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
June	1,308,987	742,794	847,024	395,329	216,620	108,042	58,620	52,700	121,851	64,872	2,162,152
6 mo.	8,107,809	4,571,942	5,234,528	2,442,141	1,314,044	636,535	360,085	314,460	788,629	409,993	.....
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	563,272	1,473,192	687,503	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,263	57,155	53,551	125,729	45,149	1,800,905
Feb.	1,155,143	654,833	733,067	348,885	219,251	105,918	50,444	47,649	107,669	44,712	1,766,434
Mar.	1,172,017	660,920	723,225	334,492	228,799	110,607	53,919	49,747	115,843	50,231	1,711,037
Apr.	1,204,801	652,962	773,538	347,121	204,805	85,239	48,506	42,650	117,929	60,023	1,614,426
May	1,100,630	620,049	698,332	317,150	186,998	91,980	44,229	39,848	117,586	53,485	1,459,305
June	835,263	502,322	616,895	292,846	19,467	10,575	44,066	44,066	103,335	51,500	1,445,521
6 mo.	6,667,139	3,785,584	4,290,605	1,999,940	1,085,024	514,582	298,319	277,511	688,091	305,100	.....

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
June	177,863	131,219	42,337	136,399	103,090	38,200	41,464	28,129	4,137	895,054
6 mo.	1,040,179	766,446	253,093	798,335	606,223	225,299	241,844	160,223	27,694	.....
July	140,317	100,141	27,585	106,684	78,034	24,516	33,633	22,107	3,069	929,978
Aug.	177,096	128,981	41,763	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Sept.	160,695	116,658	35,500	120,632	89,711	33,086	40,063	26,887	2,414	918,038
Oct.	189,929	139,953	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,034	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,298	29,341	45,348	34,150	3,872	846,436
Total	2,050,054	1,506,903	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
Jan.	183,738	139,488	37,091	133,985	102,265	31,806	49,753	37,223	5,285	869,299
Feb.	174,626	133,602	31,719	125,484	94,969	28,251	49,142	38,633	3,468	856,872
Mar.	173,694	131,997	32,118	125,787	95,206	27,782	47,907	37,196	4,336	857,115
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,223	804,695
June	141,628	114,410	30,455	101,850	84,388	26,815	39,778	30,818	3,640	846,459
6 mo.	1,022,396	785,951	200,159	739,043	569,772	175,447	283,353	218,653	24,703	.....

[1] Source: Bureau of Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	310.0
Apr.	490.1	385.1
May	431.7	225.2
June	393.2	353.8
July	390.3	343.9
Aug.	404.5	....
Sept.	346.5	....
Oct.	372.4	....
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,523,396
1951			
May	6,747,900	6,716,780	367,946
5 mo..	32,721,798	32,592,096	1,650,591
June	6,567,640	6,638,043	324,758
July	6,629,863	6,495,585	301,447
Aug.	6,768,161	6,674,495	299,027
Sept.	6,470,658	6,366,969	274,017
Oct.	6,742,767	6,727,211	292,737
Nov.	6,501,098	6,562,279	272,333
Dec.	6,738,759	6,821,446	249,490
Total .	79,133,744	78,868,124	3,664,404
1952			
Jan.	6,804,106	6,760,011	261,148
Feb.	6,358,715	6,411,905	251,125
Mar.	6,779,639	6,743,944	264,488
Apr.	5,806,153	5,770,711	261,972
May	5,960,867	5,882,922	253,605
5 mo. ..	31,689,480	31,569,493	1,292,338

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	24,211
March	31,997	23,890
Apr.	30,472	22,547
May	33,267	21,740
June	33,817	21,274
July	32,016	18,947
Aug.	25,285	.....
Sept.	22,285	.....
Oct.	23,124	.....
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	579,332	376,681	.....
1951			
June	45,537	31,802	95,174
6 mo.	277,596	186,787	.....
Total	494,950	328,183	.....
1952			
Jan.	38,027	24,974	70,262
Feb.	34,307	23,006	70,034
Mar.	35,083	23,443	67,846
Apr.	37,312	23,741	63,753
May	35,775	22,410	62,397
June	33,848	21,424	60,807
6 mo.	214,352	138,998	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
June	5,911.3	254.2	276.5	4,631.9	748.7	5,348	486	30	11
6 mo.	34,634.4	1,602.0	1,532.8	27,169.2	4,330.4	31,649	3,119	186	69
July	5,994.8	280.4	250.0	4,702.8	761.6	5,317	378	23	10
Aug.	5,988.6	252.7	254.4	4,723.3	758.2	5,358	465	30	11
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	5,452	466	29	14
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	5,139	441	29	11
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	433	27	7
Apr.	5,170.0	243.8	218.5	4,069.9	638.0	....	....	....	....
May	5,414.2	245.4	236.0	4,295.6	637.2	....	....	....	....
June	1,043.2	133.7	103.1	758.6	47.7	....	....	....	....
6 mo.	29,519.7	1,351.5	1,377.9	23,189.2	3,601.2	....	....	....	....

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Apr.	5,987,947	3,013,527	1,029,069	545,897	103,458	37,973	704,416	457,521
4 mo.	23,488,411	11,816,141	4,039,454	2,130,830	423,208	156,484	2,744,994	1,755,339
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,644	2,581,856	747,864	393,254	80,903	29,858	632,782	421,689
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,446
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Jan.	5,847,011	2,788,426	846,891	449,935	101,211	38,150	743,233	470,126
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,161
Apr.	5,360,417	2,657,926	834,066	440,035	106,059	38,888	684,318	427,339
4 mo.	22,682,463	11,008,808	3,261,415	1,725,102	394,921	147,587	2,866,663	1,812,951

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

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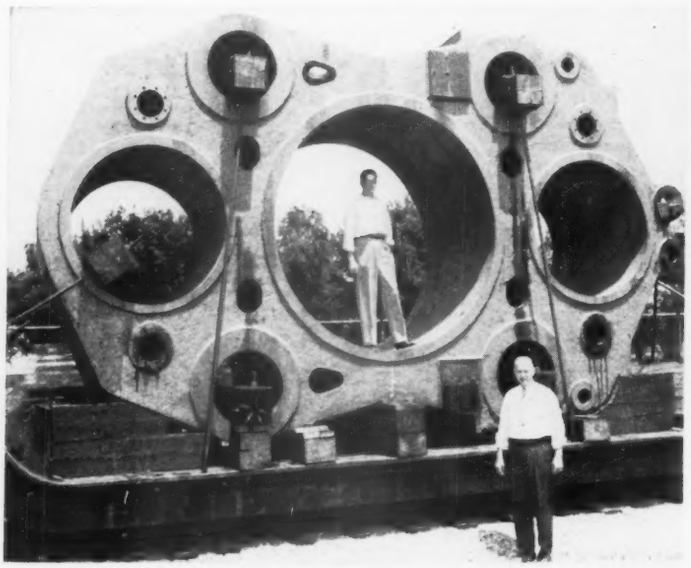
NEWS VIEWS

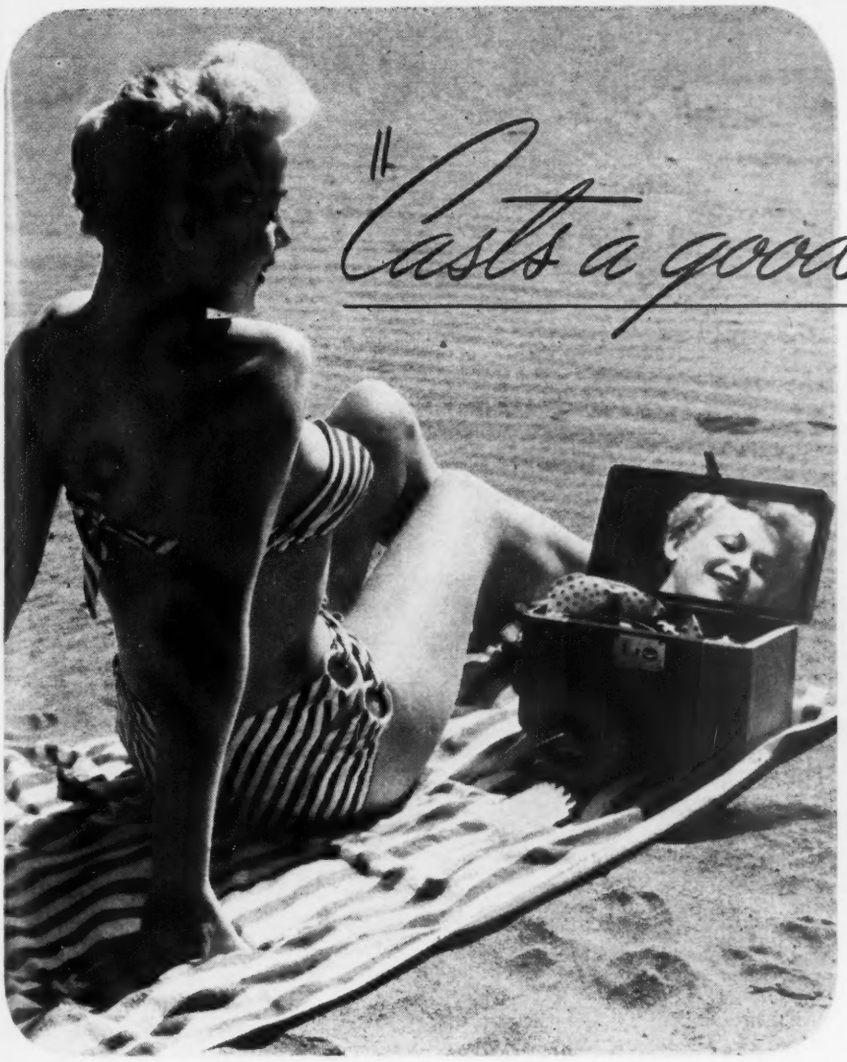


107-TON CASTING: This 107-ton steel casting, ready to be unloaded at Aluminum Co. of America's Lafayette (Ind.) Works, is the largest extrusion press cylinder housing in the U. S. A. It will be part of a 13,200-ton extrusion press which by early 1953 will be capable of producing large, intricate aluminum parts for tomorrow's airplanes. Government has first call on all production.

FOUNDRY EDUCATION: This is one of 11 animated color display panels designed by and built for Steel Founders' Society of America to be shown to engineering student and faculty groups in 128 universities and colleges. Box holds free postal card request forms enabling students to obtain technical literature published by the society.

SAFE VACATIONS: The day before its vacation shutdown recently, Hamilton Foundry & Machine Co., Hamilton, O., set up this safety display at the entrance to the plant. Whether the display was responsible can't be determined, but all 350 employees returned safely from vacation. In the picture are members of the Hamilton Police Dept. and Hamilton Foundry officials.

MOBILE SCHOOLS: Representatives of Miller Motor Co., Chicago area manufacturer of cylinders, boosters and accumulators, use a fleet of converted buses like this one to instruct groups of design, engineering, production and maintenance men on the proper use, maintenance, operation and testing of air and hydraulic cylinders in order to obtain the maximum efficiency and service life.



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AROUND THE COUNTRY

News Reports from . . .

MOST significant feature of recent foundry activity in this area is the resurgence of automotive production. Last month was spent gathering steam for the final quarter's production push, which will take several makers to the highest daily rates they have ever achieved. This, of course, is being reflected in schedules on some members of the foundry industry, with the result that overall foundry activity in this area may be better than it has been in the last year and a half. Small job shops are the only ones complaining they have not benefited in some measure. Major production foundries are working generally on a five-day week again.

The situation, of course, has some high and low spots. Steel foundries by and large suffered little from the summer slump, although the duration of the steel strike curtailed a few operations. Some of the drive has gone out of the machine tool program, which reflects itself in reduced castings backlogs for some specialists in this field, but output has continued at a fairly consistent high level. The cyclical die programs of automakers are about at low ebb currently with new models on the eve of introduction. Leading the new car parade will be, in all probability, Chrysler's restyled offerings, all of which sport new bodies and have abandoned much of the traditional styling conservatism which has marked these cars for more than a decade.

Chrysler, incidentally, is understood to be planning a substantial increase in its torque converter production, the plaster-cast aluminum turbine unit representing a nice piece of business for the foundry which ultimately gets it. Currently two sources are said to be bidding—Aluminum Co. of America and General Motors' Fabricast Division. Converter design elsewhere in the automotive industry has been undergoing extensive revision. A small Allison torque converter, ostensibly designated for tractor application, reportedly is being installed in some Canadian-built Chevrolets, and it is rumored in some circles that this unit may be adopted by Pontiac Division. Other aluminum casting opportunities exist as government officials start urging auto and truck makers to reconvert to the light metal after the first of the year because of the easier supply.

It is reported that both Chevrolet and Pontiac will go to aluminum pistons in their new models. Neither of these GM divisions, incidentally, will be able to bring out their new V-8 engines in 1953 models, although both power plants are believed to have been completely engineered and several test cars are reportedly equipped with them.

An interesting under-the-surface conflict between shell molding enthusiasts and forging proponents exists in the case of Ford and the Dodge Division of Chrysler Corp. The latter organization has developed a continuous press forging operation for production of automotive crankshafts, while the former has pinned its hopes on shell-molded nodular iron cranks. Both are believed to have the most highly mechanized operations for their respective processes that engineers have been able to develop, so the advantages of one over the other will have to be enormous before either party will abandon its present setup.

Little reaction was heard in the foundry trade to the new pig iron prices, it having been a foregone conclusion after the steel strike's settlement that iron would have to go up. Foundrymen, however, have not taken so kindly to the rise to ceiling of cast scrap prices, and many have tried to hold off buying in the belief that some reduction could be realized. At mid-month, however, dealers reportedly were showing little inclination to part with scrap for less than ceiling, and with foundry activity rising and pig iron supplies not overly abundant, little fluctuation in the scrap market was expected. Coke is something else again. Inventories for most foundries continue to be satisfactory and threat of a coal strike has not acted as a spur to protective buying.

EFFECTS of the steel strike are slowing down activity of steel foundries.

Accurate business barometer of steel foundries is oil well drilling and completion rates and refinery activity. With oil well casing and other tubular oil goods in short supply due to the steel strike, drilling rates are down. Coupled with caution of drillers to stock up in the face of an uncertain market, orders for castings are fewer. This is especially true in the Middle West where the steel strike-caused shortage of tubular goods was most severe.

The tubular goods shortage is expected to continue for months. It is forecast by industry observers that completions of new wells for the nation during 1952 will fall to 42,034, or 8000 fewer wells than in 1951. Petroleum refineries, however, are extremely active and petroleum production has been unaffected by the strike.

Operating rates of steel foundries generally are down 25-30 per cent. Prospects are that fourth quarter will be dull. Not until tubular goods are available in some abundance—estimated to be in the first quarter of next year—will a large segment of the local foundry industry experience better business, it is felt.

Nonferrous foundries continue at about 60 per cent of capacity. Aluminum and magnesium foundries are the most active, operating at capacity, with magnesium foundries booked until mid-1953. Only cloud on the horizon for these foundries is

(*Concluded on page* 154)

how do your materials handling methods

Measure Up?

An inventory of your materials handling methods might be profitable to you today. Are your methods of getting materials through production processes really modern methods? Are you getting finished products to storage or shipping via the best and most economical way? In other words, has your materials handling kept pace as you have grown and expanded your production?

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(*Concluded from page* 152)

stretch-outs in aircraft production. Each schedule elongation takes the bloom off their prospects just a little more. At the last schedule shuffle, which moved back the scheduled peak in aircraft production until mid-1955, magnesium foundries reduced working schedules from 9 hours-6 days to 8 hours-5 days. A new stretch-out being discussed by Washington planners would elongate plane schedules so that the peak of production would be moved into 1956.

A big new market for nonferrous foundries is for guided missile requirements. But with guided missile plants still under construction the only casting orders placed currently are for prototype parts.

Wage discussions and new contracts are moving closer. One large foundry took the initiative in signing a contract that provided increases up to 12 cents an hour. Basically it was in the pattern established by the steel industry settlement. All foundrymen expect the wage issue to come up for bargaining shortly. Already a rash of strikes has broken out at the local aircraft plants, tying up vital plane production.

FOR the first time since spring, the majority of gray iron foundries are now operating five days a week. This is the result of a slow but steady rise the last few weeks, as metalworking industries recovered from effects of the steel strike and responded to normal seasonal influences. Most shops anticipate a further increase in business through October and possibly well into November.

Despite this uptrend, makers of large iron castings are doing little more than holding their own, if that. Retarding activity is a dip in machine tool requirements. This district has few large makers of machinery, but has benefited for some months by the subletting of machinery castings to shops in this area. This type of work is now beginning to fade.

Steel casting demand has continued at high level and with little let-up for months, although lower than a year ago. Even during the disruption in many branches of metalworking this summer because of the steel strike, inquiry for steel castings remained strong. There is relatively far more defense work in steel than in any other branch of the foundry industry and far more than enough civilian demand to take care of remaining capacity. Hence consumers of steel castings were confident even during the steel strike that such castings would continue scarce, and, therefore, continued to press for tonnage as hard as ever. Most steel foundries now have backlogs of anywhere from 16 to 20 weeks.

Malleable shops are in need of work. Automotive requirements are better, but farm equipment demand is off seasonally and the railroads and railroad equipment manufacturers are contributing far less than they did a few months ago. However, volume is up a bit from the low point this summer. Malleable shops, incidentally, are still benefiting by the overflow of business at steel foundries, as some buyers, unable to get steel, are substituting malleable.

Brass shops are showing some pickup, as they are now permitted somewhat more flexibility in the use of copper and certain other of the more critical metals. Shops generally are not being allocated any more metal, but they can use what they are getting with fewer restrictions. Magnesium foundries, of which there are relatively few in this area, and aluminum production shops are still actively engaged in aircraft work. Aluminum jobbing foundries are aided by improved civilian demand.

Pig iron and scrap are in adequate supply, except for basic iron.

STERN FRAME: This 48-ton steel casting serves as the framework for the propeller and rudder of a 647-foot ore carrier built for the Pittsburgh Steamship Co., a U.S. Steel subsidiary. Three of these boats were launched in recent months. The frame was cast in three pieces by the Penn Steel Castings Co., Chester, Pa., and then joined together by welding

Will Discuss Corrosion

Three educational lectures on corrosion fundamentals will be held at the annual conference of the National Association of Corrosion Engineers in Chicago on Mar. 16 to 20, 1953. Those will be in addition to the proposed eleven symposiums and two roundtable discussions. The symposiums include cathodic protection, chemical industry, corrosion principles, electrical and communications industry, fresh and salt water corrosion, high temperature corrosion, oil and gas production industry, pipe line industry, protective coatings and refinery industry. Roundtables will deal with pipe line and general corrosion problems.

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By EDWIN BREMER

Foundry DEVELOPMENTS

IMPROVED extensometer with new time-saving and protective features has been developed by engineers of Battelle Memorial Institute, Columbus, O. Instrument automatically releases itself from the test specimen before the breaking point is reached and without stopping the test. Breakaway feature is particularly useful in high-temperature testing operations. In such operations the protection and insulation of the extensometer have been problems. Automatic release protects not only the extensometer, but also the supplementary indicating and recording mechanisms used in the test.

* * *

STUDIES on how to overcome the porosity and brittleness produced in steel by hydrogen are described in two government research reports now available from the Office of Technical Services, Department of Commerce, Washington 25. One is Pb 105103, "The Analysis and Sampling of Liquid Steel for Hydrogen," which contains 96 pages and sells for $4.25 in microfilm and $12.50 in photostat form. The other is Pb 1052290, "Hydrogen Embrittlement of SAE 1020 Steel" which comprises 30 pages and sells for $3.75 in photostat and $2.00 in microfilm form.

* * *

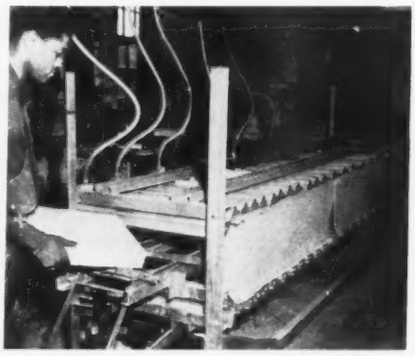
BRITISH oil firm recently has developed two petroleum-based types of "inks" or fluids for non-destructive crack detection. One is for magnetizable materials, and may be obtained in black, red, white or yellow pigment. The other for non-magnetic materials fluoresces with a brilliant green color when irradiated with ultraviolet light.

* * *

CHEMICAL etching technique to improve rust in eroded sections or holes in cast iron and steel previous to welding or painting was described in the April issue of *Chemical Engineering*. Procedure is to wire brush the area to provide a roughened surface, and then build a dam around it with acid-resistant clay. The well or reservoir so formed is filled with a 1:1 solution of hydrochloric acid saturated with diphenyl guanadine, and left preferably overnight until the rust is dissolved. Then the area is washed thoroughly with water and dried.

* * *

PLASTER molds used for producing aluminum alloy castings at Scientific Cast Products Co., Cleveland, now are being dried more uniformly with heat supplied by infrared electric units. As indicated in the accompanying illustration the radiant heaters are located on the top and bottom of a conveyor unit which is 12 ft long. First 8 ft contains the



36 electric heaters with a total capacity of 39.6 kw. Molds are moved through the conveyor at the rate of 1½ in. per minute maximum. One size 12 x 22 x 1½ in. dries in 1½ hr, and another 12 x 22 x 2½ in. dries in 2 hr. It is claimed that rejected molds have been reduced from 25 to 10 per cent. Electrical heating units were supplied by Edwin L. Weigand Co., Pittsburgh.

* * *

LARGE manufacturer of bath tubs is reported to use metallizing to provide a long-wearing surface on new cast iron patterns as well as to repair them when they have become worn or damaged. Previous to metallizing with a bronze coating, they are blasted with steel grit. After coating the surface is finished by machining, filing, grinding, and finally with emery cloth. It is claimed that the bronze coating permits the patterns to remain in the sand much longer than without the coating, and in the case of repairs the time is much shorter than with previous methods.

* * *

REGULAR monthly checks of compressed air distribution system for leaks will save money according to the Compressed Air & Gas Institute since it usually causes low pressure resulting in a drop in production output of air-operated tools. It has been found that if the pressure at a pneumatic tool decreases from 90 psi to 70 psi, the production output may drop as much as 35 per cent. Methods of checking for leaks include use of the lighted candle, solution of soapy water brushed around suspected areas, essence of peppermint in the air system, and use of a small siren-like whistle which is passed over the line.

* * *

LEAD-COVERED heating cable in a specially designed jacket prevented freezing of sand in the discharge pipes of dewatering towers at the sand plant of George F. Pettinos Co., Manumuskin, N. J. Sixty-foot lengths of heating cable made by General Electric Co., were installed in a sheet metal form which fitted over two 2-in. discharge pipes and a section of the lower part of the tank. Control of heating is manual, and a switch at the classifier control board permits the operator to turn on the heat when the outside temperature drops below 28° F.

* * *

NEW infrared sensitive motion picture film which permits motion pictures to be made in the dark with infrared illumination or in the semi-dark without, has just been made available through Kodak Industrial dealers by Eastman Kodak Co., Rochester, N. Y. Known as Kodak spectroscopic I-N film, it originally was intended for spectrographic laboratory work, but is now being used for many other purposes such as audience reaction and ultra high-speed photography where its sensitivity to the infrared range of the spectrum makes it particularly valuable for recording —without supplemental illumination —the flow and action of molten or hot metals. Film can be used in any standard 16 or 35 mm motion picture camera accepting roll film or 16 mm magazines. It will not be available in 35 mm cassette loadings for 35 mm still cameras. Film is processed by user by developing 4 to 8 minutes in D-19 which results in a photographic negative from which a projection positive film is made.

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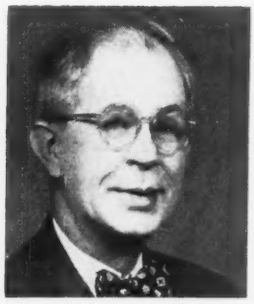
MAN-TO-MAN

on the Molder's Bench

"Expansionitis"

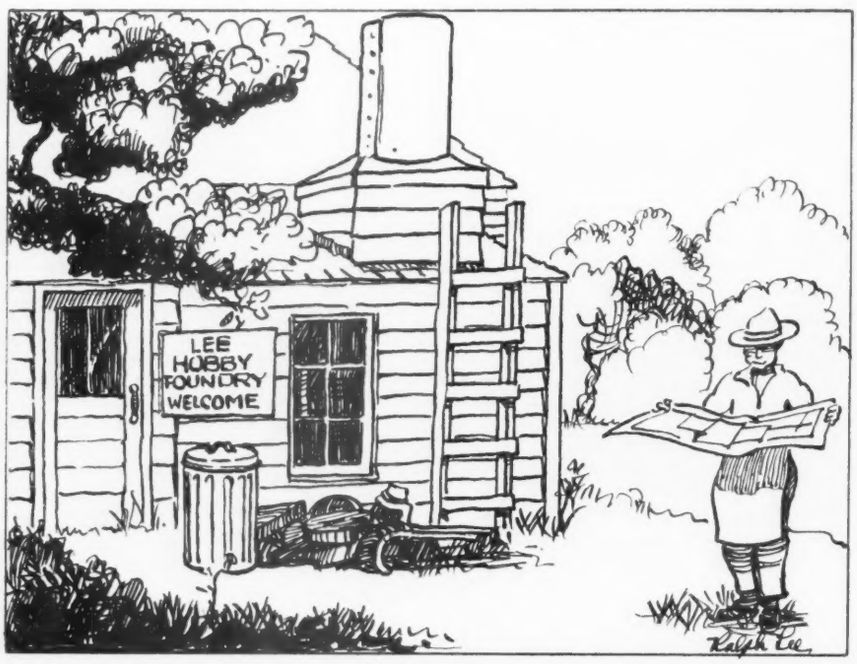
By RALPH L. LEE



THE Lee Hobby Foundry is literally bursting at its seams, for there isn't one square foot of floor, wall, ceiling, drawer, shelf or cupboard space that isn't doing full duty. For instance, when we want to fire the cupola we have to move the molding bench or the molding machine out into the combination storage and cleaning room. This, of course, is a bad situation; in fact it's been haunting me for years.

What we really should do is to add an extension onto the extension of the pattern shop where the cupola, molding equipment, sand conditioner and forge (for shame) are now. It really should be done anyway, aside from giving us the room we need. The cupola is so darned close to the wooden walls that I more or less keep my fingers crossed for fear of fire some day during a long melting run. A cinder block extension for the cupola certainly would fill the bill. Of course, if we went to the trouble and suffered through the mess of building, we might just as well make the extension big enough for the nonferrous furnace, which never should have been out in the cleaning room in the first place.

With both the cupola and the nonferrous furnace moved quite some distance from the cleaning room, which by the way is also being used as a pouring floor, we might as well make the extension big enough to provide for more pouring floor space and make it much nearer at hand, too. Heaven only knows we could use the floor space in the cleaning room, for the way it is now we have to stop cleaning operations while we're pouring off.



More space in the cleaning room would enable us to move the forge out of the extension of the pattern shop where, as I said before, we have been doing our molding. Many a time I have backed into the hot forge while carrying a mold out into the cleaning room. Then too, I could move that large cupboard with all of the alloys and core-making stuff out of the pattern shop and into the cleaning room where it really belongs. You see, the pattern shop is filled to the gills too. That way I could put the spindle-sander where the cupboard is and make room for a thickness planer I've been thinking of buying some day. (Gosh, they come high.)

While making it clear that I was just toying with the idea of building an extension, I talked to the superintendent (that's Mrs. Lee, the vice president in charge—the treasurer, too), and she said, "Well, Daddy, if you've thought it through and think it's the thing to do, I guess we can scrape up the wherewithal." She's just like most other good executives, always tossing problems right back in your own lap.

The funny thing is that even with the approval, the budget and everything, I got cold feet on the whole deal. I got to thinking about what would happen if we went ahead. I knew darned well that with an organization the size of ours (1 man), everything else would come to a halt. There are two allfired important projects on the fire, and neither one of them would be helped one bit by the extension program. In fact, it would paralyze them.

Then in going back over our backlog of other projects, I couldn't find one that would be helped one way or the other. If there were a lot of new business in the offing, not suspects but real bonafide prospects which hinged on our having more room, that would be a horse of a different color. Then I got to thinking that I haven't learned all of the tricks of making the most of the room we already have.

The climax, though, was a visit, just yesterday, by four of the top foundrymen in the country, who patted us on the back for the jobs we have been able to turn out in spite of the size of our little ol' peewee Lee Hobby Foundry. One of them came right out and said that he thought it was a darned good thing for a foundry to be crowded and that he hadn't the slightest doubt that one of the main reasons why his organization has gone to town (and by the way

(*Concluded on page* 160)

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(*Concluded from page* 158)

it sure has gone to town) is that they are hemmed in by the railroad tracks on one side, the river on the other and the city at both ends. He said that they just had to make the most of the room they had and that to do it they were forced to be downright ingenious.

While I'm running around the country as a representative of one of the largest industrial organizations in the nation, many of the business folks I visit, after taking me through their plants, sort of apologize for their smallness. "Of course, Doc," they say, "compared to you fellows we're just midgets." With no intention of wise cracking I just can't help saying, "Well, after all, I guess a plant is sort of like a shoe, isn't it? It's got to fit. If it's too little it's no good, and if it's too big, it's just as bad."

Of one thing I feel pretty sure. Building new additions just to keep up with the Joneses or to make impressions on the public and the trade can be mighty risky. It certainly doesn't take nearly as much brains and ingenuity to spread out as it does to pull rabbits out of the hat in the old place, whether in terms of quantity or quality.

It just struck me that if the dozens of foundries I have visited all over the country were divided into two groups, those who were bursting at the seams and those who were rattling around a bit, that the seam busters would be 'way out in front by every business measure that counts.

I'll never forget one bangup organization run by the sons of the man who founded and developed the business. Knowing the danger of splurging with building materials and trying to measure business success by the square foot, he left the business to his sons with the proviso that it would be theirs only as long as they continued to operate within the limits of the plant as he left it.

Then I know I'll never forget another business run smack into the ground by the son of another founder, just a year or two after his death, who did not make provisions in his will for the difference between legitimate growth and artificial plant inflation.

I may be wrong, as I frequently am, but it may well be that the healthiest condition for any business is for it to work under compression as far as square footage is concerned. A snug fitting plant is usually proof that all of it is being used to the limit. It forces everybody in it to make the most of everything he has in order to keep things moving, to get rid of junk, including mistakes, and to keep everything on the move. There isn't room for anything or anybody to squat for long. There has to be a place for everything, and everything has to be kept in its place (as on shipboard, where there isn't any room for anything unnecessary or for anybody who can't earn his salt).

Of course, there may come a time when the Lee Hobby Foundry pops its skin and when for a spell we may have to do some work out in the open under the big oak tree. But one thing I'm sure of—that day is not going to be the major object of our efforts. In fact, we're going to make it sort of a game to accept the physical limitations of the place, like the rising of the sun, and start from there to demonstrate what really can be done with the tools and the plant we have. I'm glad this extension business is out of the way for the time being, anyway; now we can settle down to the worthwhile jobs at hand.

Meetings of Interest to Foundrymen

Oct. 10—Malleable Founders' Society, Supervisory Development Conference, Hotel Cleveland, Cleveland

Oct. 16-17—Gray Iron Founders' Society, annual meeting, Hotel Cleveland, Cleveland

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18 — Michigan Regional Conference, Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, AFS, University of Michigan, Ann Arbor, Mich.

Oct. 18-24 — American Society for Metals, National Metal Congress and Exposition, Philadelphia

Oct. 20-24—National Safety Council, national safety congress and exposition, Chicago.

Oct. 20-24—Society for Non-Destructive Testing, annual meeting, Philadelphia

Oct. 24-25—New England Foundry Conference, MIT, Cambridge, Mass.

Oct. 24-25—Northwest Regional Foundry Conference, Oregon, Washington, and British Columbia Chapters, AFS, Multnomah Hotel, Portland, Oreg.

Oct. 30-31—Metals Casting Conference, sponsored by Purdue University, Michiana and Central Indiana AFS chapters, Purdue University, West Lafayette, Ind.

Nov. 6-8—All Canadian Foundry Conference, sponsored by Eastern Canada and Ontario Chapters, AFS, Mount Royal Hotel, Montreal

Nov. 13-14—Southwestern Regional Foundry Conference, Texas and Tri State Chapters, AFS, Baker Hotel, Dallas, Tex.

Nov. 19 — American Standards Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 20-21 — American Society for Quality Control, Midwest conference, Claypool Hotel, Indianapolis

Dec. 3-5—Society for Experimental Stress Analysis, annual meeting and exhibition, Hotel McAlpin, New York

Dec. 4-6—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference William Penn Hotel, Pittsburgh

1953

Jan. 19-22—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Jan. 23—Malleable Founders' Society, general society meeting, Hotel Cleveland, Cleveland

Feb. 6-7—California Regional Foundry Conference, Berkeley, Calif.

Feb. 12-13—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter, AFS, and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 19-20—Southeastern Regional Foundry Conference, sponsored by Birmingham, Tennessee, and University of Alabama Student Chapters, AFS, Tutweiler Hotel, Birmingham

Mar. 2-6 — American Society for Testing Materials, spring meeting, Statler Hotel, Detroit

Mar. 11-12—Foundry Educational Foundation, annual TAC-UAC conference, Cleveland

Mar. 23-27—American Society for Metals, western metal congress and exposition, Pan-Pacific Auditorium, Los Angeles

Apr. 9-10—Malleable Founders' Society, fourth annual market development conference, Cornell University, Ithaca, N. Y.

May 4-8—American Foundrymen's Society, annual convention, Chicago

June 29—July 3—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City

Oct. 8-9—Gray Iron Founders Society, annual meeting New Hotel Jefferson, St. Louis

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3432

The Plant Engineer

His Functions and Responsibilities

By HAROLD E. PRIDMORE
Foundry Consulting Engineer
Hinsdale, Ill.

WHAT is a plant engineer? He is a person who integrates the facilities of a manufacturing plant so that it can build the product the principals require. He develops the tools, arranges the space and provides the power for the production department to use. In the small shop this work is carried on by the boss. As a shop progresses in size the work is delegated to others.

The department superintendent covers the engineer's work in the medium sized factory but as the work area grows, an individual is selected to cover only this phase of operation. The complications of manufacturing cause the plant engineer in a larger operation to augment his services with assistants until, as size progresses, the plant engineering department becomes a function so vast that it must be integrated into its several evaluations.

The plant engineer's work is a composite of the work of several trades and demands a knowledge of each. To him is delegated every function of manufacture except production and product development. The plant engineer who has the greatest value is the one who makes a practice of visiting other plants. His knowledge is greatly enhanced each time he looks in someone else's window or walks the aisles of a strange shop.

The purchasing department is dependent on the plant engineer for the proper execution of its functions. The plant engineer writes the specifications of the products which make possible continued operation of the establishment. He expects the purchasing department to route visitors who have information relative to plant operation to him. New equipment purveyors are a source of information for the plant engineer in that their travels take them into so many establishments that they may possess the answer to a plant problem in his plant.

The purchasing department should keep a current file on all purveyors, listing all of their services and cross indexing the facts as may be required. Many purchasing departments list each visit. When visitors are not received through the purchasing department, a registrar in the reception area should be provided. Often the person who has been visited files a little resume about the visitor, thereby gathering information for future use.

When these files are kept by the purchasing department, they are generally more current and contain greater detail about the purveyor's objective. The purchasing department operates for all service requirements of an establishment and should correlate and disseminate information for and to the plant engineer, the production department, the sales department and the executive group.

In the integrated operation of a foundry and machine shop, the plant engineer is a key to the smooth function of each department. He works with the machine shop superintendent to develop the machinery required for the product. He may gather data from manufacturers of required machinery and tooling, and he may design special tools that are not available in the commercial markets. He works with the foundry superintendent to give the foundry the patterns or pattern equipment necessary to produce good molds; equips the foundry with machinery that produces at the lowest costs; helps the yard superintendent lay out his bins for the storage of materials; plans the access route from the foundry to the machine shop, and provides yard machinery in keeping with the plant operation.

The maintenance superintendent is directly involved with the plant engineer insofar as costs of operation are involved. He reports to the plant engineer any weaknesses of equipment or plant and helps in the proper development of equipment created in the plant. The plant engineer must correlate the production equipment of an establishment whether it be a foundry, a machine shop, a press shop, a printing plant, an oil refinery, a steel mill or a government installation.

The plant engineer and the safety program have a very close mechanical relationship. Plant equipment must be provided with the necessary guards to make its operation as safe as possible. Constantly on an inspection tour, he co-operates with the safety committee to locate weak links in the chain of human and mechanical workers.

He develops equipment that will assure safety to the worker. He provides laboratory assistance to the safety program and keeps records on the latest safety equipment available so that when the proper time arrives he has information for the development of new products as required. The plant engineer is responsible for the decay of any program and in most cases is responsible for keeping any establishment moving forward. Since safety is the key to low-cost operation, the effective plant engineer rates very high in the esteem of management.

Trade journals are a source of extensive information for the plant engineer. All such papers that arrive at a plant should be routed through the office of the plant engineer. The perusal of periodicals of technical nature should be a requirement, and a cover-to-cover digest should be made. Any information gathered that should be augmented is best confirmed by the purchasing department which can then record and register purveyors. If a product or information is required at a later period, the records will then contain the necessary data.

Every plant, large or small, receives much direct mail advertising, but there are too few that correlate the subject matter to the advantage of the establishment. The mail room is generally the routing source of this class of literature, but often a piece is missent or is lost to the persons who could most benefit from it. Most material of this nature should go through the purchasing department for the correlation of subject matter

(*Concluded on page* 164)

REDUCE YOUR CASTING REJECTS--

Reach for your phone

CALL MAIN 1-6062
CLEVELAND, OHIO

Leading foundries have called for Famous Cornell Cupola Flux for more than thirty four years, because it plays a most important role in the production of *better iron for better castings.*

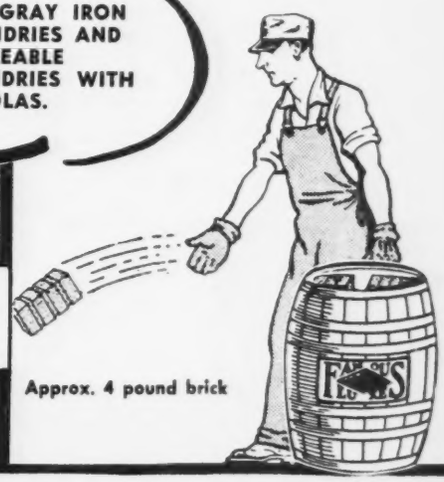
Famous Cornell Cupola Flux purges molten iron of impurities, increases its fluidity, reduces sulphur and keeps slag fluid. It is the key to minimized casting rejects and labor loss—castings are cleaner, sounder, more even in grain, easier to machine.

KEEPS CUPOLAS CLEANER AND IN MORE EFFICIENT OPERATION, 100. It reduces down time and maintenance cost amazingly. Bridging over is practically eliminated. Drops are cleaner. There is less erosion of brick or stone (less repairing) due to a glazed vitrified surface which is formed in cupola lining.

PRE-MEASURED SCORED BRICK FORM is so easy to use that practically no labor is involved. You simply lift Famous Cornell Cupola Flux from container and toss it into cupola with each ton charge of iron, or break off one to three briquettes (quarter sections) for smaller charges as per instructions.

Famous CORNELL CUPOLA FLUX

FOR GRAY IRON FOUNDRIES AND MALLEABLE FOUNDRIES WITH CUPOLAS.



WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

1126-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Brass contains no metal after this flux is used.

(*Concluded from page* 162)

and then be routed to the engineering or production department or both, as the case may demand. If a sender of direct mail advertising expects a 5 per cent return from his mailing, there is no reason why any manufacturing plant should not expect to gain information from this literature. A large group of travelers make a business of visiting manufacturing establishments. These people are the salesmen who strive to associate their products with your business. Members of the group known as manufacturer's agents are generally salesmen only. They handle many products. Information from them is reliable but it may be very brief. However, the salesmen who are direct representatives of manufacturers are trained to give information on many subjects so that their visits to your plant should be welcomed at all times. The direct representative has something new each time he calls, and often his visit is very productive to the plant engineer.

Members of a third group whose visits should be given cognizance are the consulting engineers. This group gathers information to disseminate to clients. The plant engineer should also at all times have one or more consultants available to help him in his problems. The consultant represents an unbiased opinion; he is your employee for the time of his service.

One of the major duties of the plant engineer is the planning and development of new machinery for the production department. He studies his problems and gathers ideas that can be correlated to help produce a usable machine. In the processing of new equipment he consults with sources of information that he has gathered in his experience. After a long session of gleaning information, the plant engineer is ready to make a rough design of his requirement. With the rough design in hand he proceeds to find a source of manufacture. Sometimes it is desirable to build the equipment in his own shop, perhaps making use of his maintenance mechanics when they are not required for other duties.

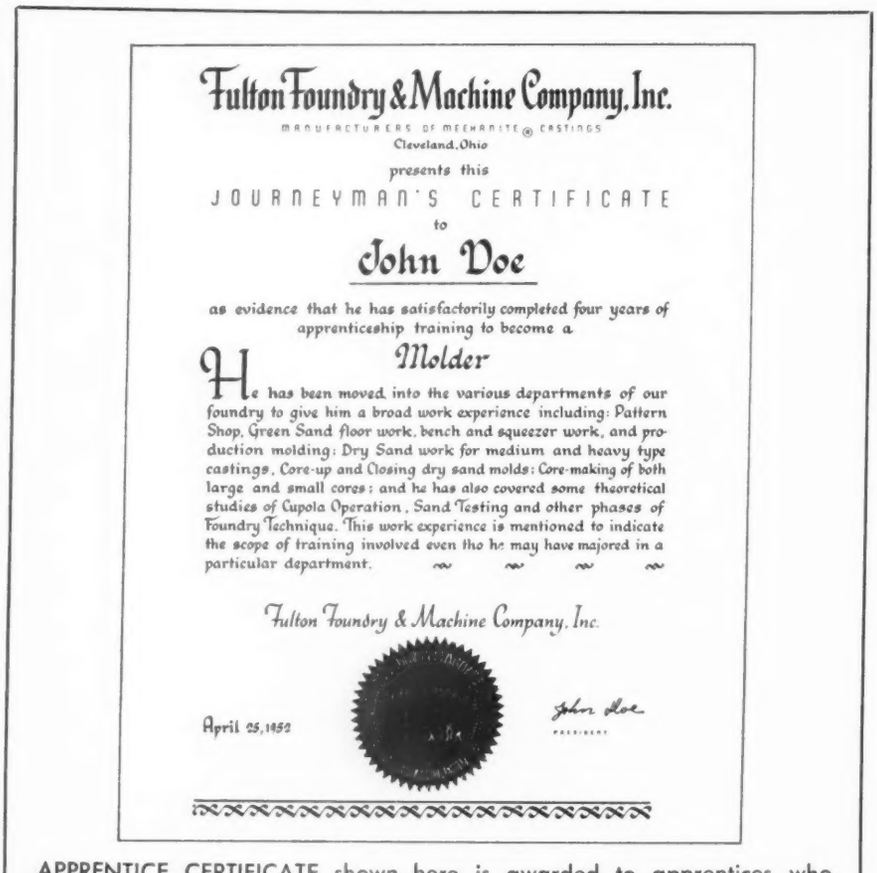
Because many times a manufacturer of equipment of a similar type has made the same item for some other customer, it is always good practice to question the engineering departments of such manufacturers. The local sales person does not necessarily know what may have been produced for a customer in another territory. After much work has been done to design new equipment, it may be necessary that it be built in a shop other than the one under his control. In such cases the traveling consultant can render his greatest service by taking over and having the equipment produced and installed.

As mentioned before, the maintenance department is responsible for keeping costs of operation low. The plant engineer is the source of information about pieces of equipment. When a breakdown occurs, the maintenance crew moves in to get the plant producing again as speedily as possible. The plant engineer must correct the equipment at the earliest time so that another similar breakdown will not occur. When the maintenance problem is too severe, the plant engineer calls the service engineer of the manufacturer to study the unsatisfactory performance and suggest a remedy that will correct the difficulty.

Source of Information

This service group is a ready source of information on many aspects of plant operation. The service man can generally help the plant engineer and maintenance group to plan a preventive maintenance program, something which does not receive enough emphasis in many plants. Efficient day-to-day operation is the result of a good preventive maintenance program. The maintenance group should not be part of the productive force, and its members are best utilized when they perform their assigned function.

The plant engineer is the auditor of mechanical functions of the plant. He is the medic who cures mechanical and production illnesses. If a plant is small and cannot afford the services of the plant engineer at all times, he should be placed on the same basis as the law counselor, engaged on a retaining fee. The larger operations utilize services of consultants to supplement their plant engineers. The plant engineer requests appropriations for the execution of long-range programs and directs the budget of current plant operations. He is the key to today's well balanced manufacturing plant.



Fulton Foundry & Machine Company, Inc.

MANUFACTURERS OF MEEHANITE® CASTINGS

Cleveland, Ohio

presents this

JOURNEYMAN'S CERTIFICATE

to

John Doe

as evidence that he has satisfactorily completed four years of apprenticeship training to become a

Molder

He has been moved into the various departments of our foundry to give him a broad work experience including: Pattern Shop, Green Sand floor work, bench and squeezer work, and production molding: Dry Sand work for medium and heavy type castings, Core-up and Closing dry sand molds: Core-making of both large and small cores; and he has also covered some theoretical studies of Cupola Operation, Sand Testing and other phases of Foundry Technique. This work experience is mentioned to indicate the scope of training involved even tho he may have majored in a particular department.

Fulton Foundry & Machine Company, Inc.

April 25, 1952

John Doe

PRESIDENT

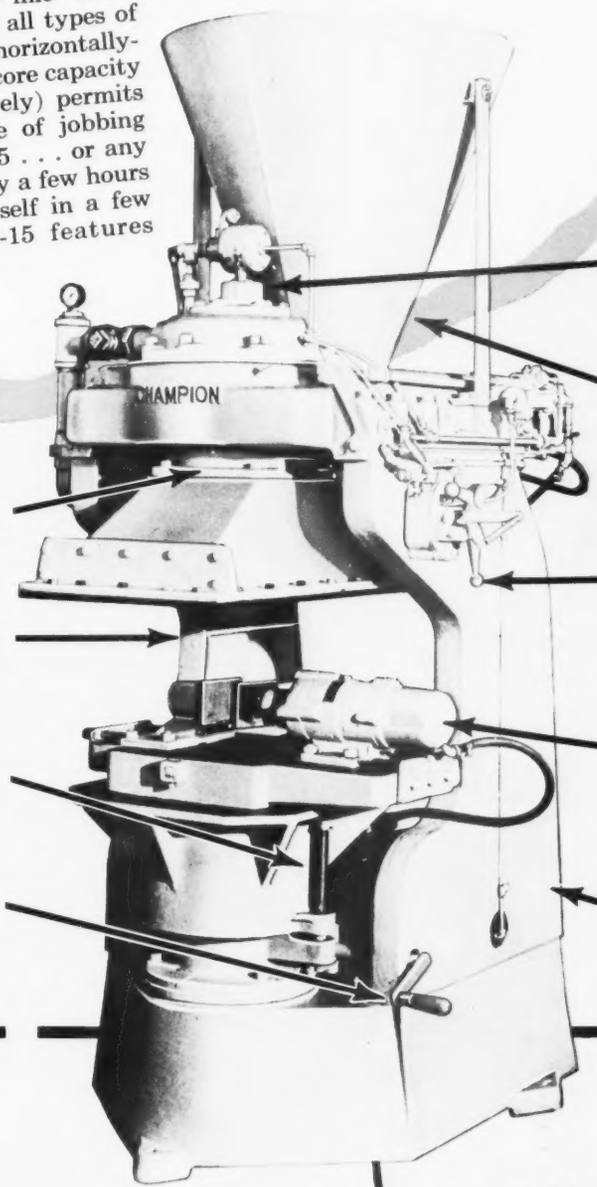
APPRENTICE CERTIFICATE shown here is awarded to apprentices who complete four years of training at Fulton Foundry & Machine Co., Cleveland. The certificate is printed in attractive color combinations and bears the gold corporate seal of the company. Graduating apprentices who receive the certificate have completed a well planned and supervised course of training which was described in the March *FOUNDRY*

THIS ONE COREBLOWER*

handles all types of core boxes!

(An Exclusive CHAMPION Feature)

* The CB-15 illustrated—like other Champion Blowers—can blow all types of core boxes, vertically-split, horizontally-split and open face. Its blown core capacity of 55 lbs. (stated conservatively) permits the blowing of a wide range of jobbing work. You need keep a CB-15 . . . or any other Champion . . . busy only a few hours a day and it will pay for itself in a few months. Check these CB-15 features illustrated!



Air volume controls prevent waste of air. Patented blow valve permits blowing of cores faster and with less air.

Cone-type suspended 500 lb. sand hopper. Vibrator is located for maximum feeding efficiency and operates automatically.

Power magazine travel between loading and blowing positions.

Single operating valve unit prevents errors — permits top speed operation. A safety interlock provides for clamping before blowing can take place.

Open-throat design — maximum working accessibility.

Adjustable table core box clamp for positive clamping of vertically-split boxes. Clamp is removable and may be replaced with a roller conveyor table.

6½ inch maximum table draw for handling horizontally-split boxes.

6½ inch table height adjustment.

Built-in air reservoir — ample supply of full pressure air for blowing.

B&P CHAMPION

There's A Champion Core Blower for every coreblowing job!

The Champion	Blows Cores Up To:
CB-5	4½ lbs.
CB-10	11 lbs.
CB-12	30 lbs.
CB-15	55 lbs.
CB-18	125 lbs.
CB-400	300 lbs.

Write Today *for a complete catalog on Champion Core Blowers! Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Ill.*

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

FLORIDA MACHINE AND FOUNDRY

puts 10 more working days in each month

with a **SANDSLINGER!**

Of course there aren't 41 days in October, but the Florida Machine and Foundry Co. at Jacksonville, Florida is *making* extra working days since installing a Stationary Sandslinger. Mold production has increased 33% and that means four days' work in every three. At the same time, molding costs have been cut by 25%.

Important savings like these can be yours, too. There is a Sandslinger or Speedslinger to suit every foundry molding requirement—jobbing or production. In most foundries, a slinger will pay for itself in a few months . . . and then will continue to increase profit over a period of many years.

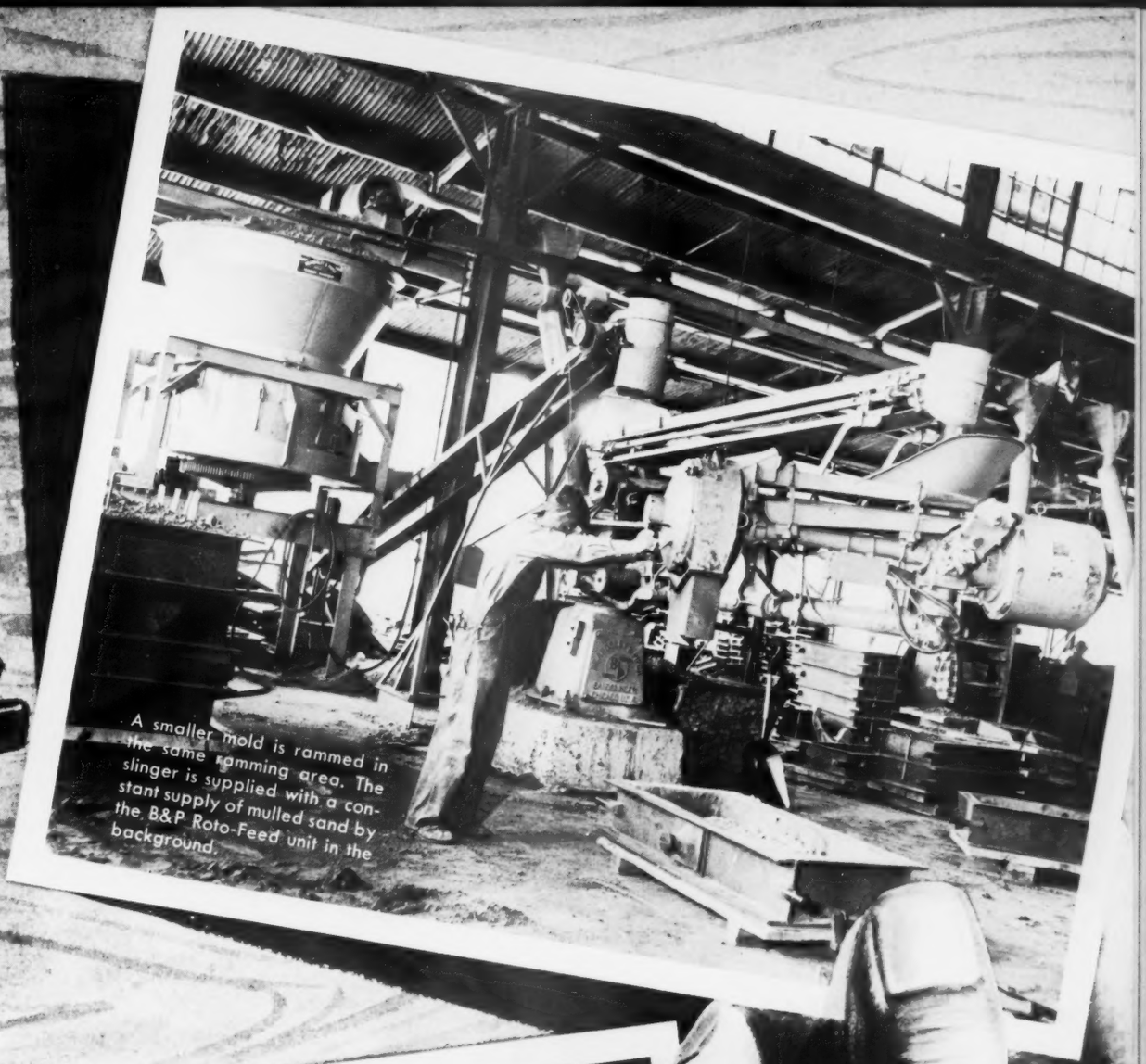
Write now for more information . . .
Beardsley & Piper, Div. Pettibone Mulliken Corp.,
2424 N. Cicero Ave., Chicago 39, Ill.

LOOK TO

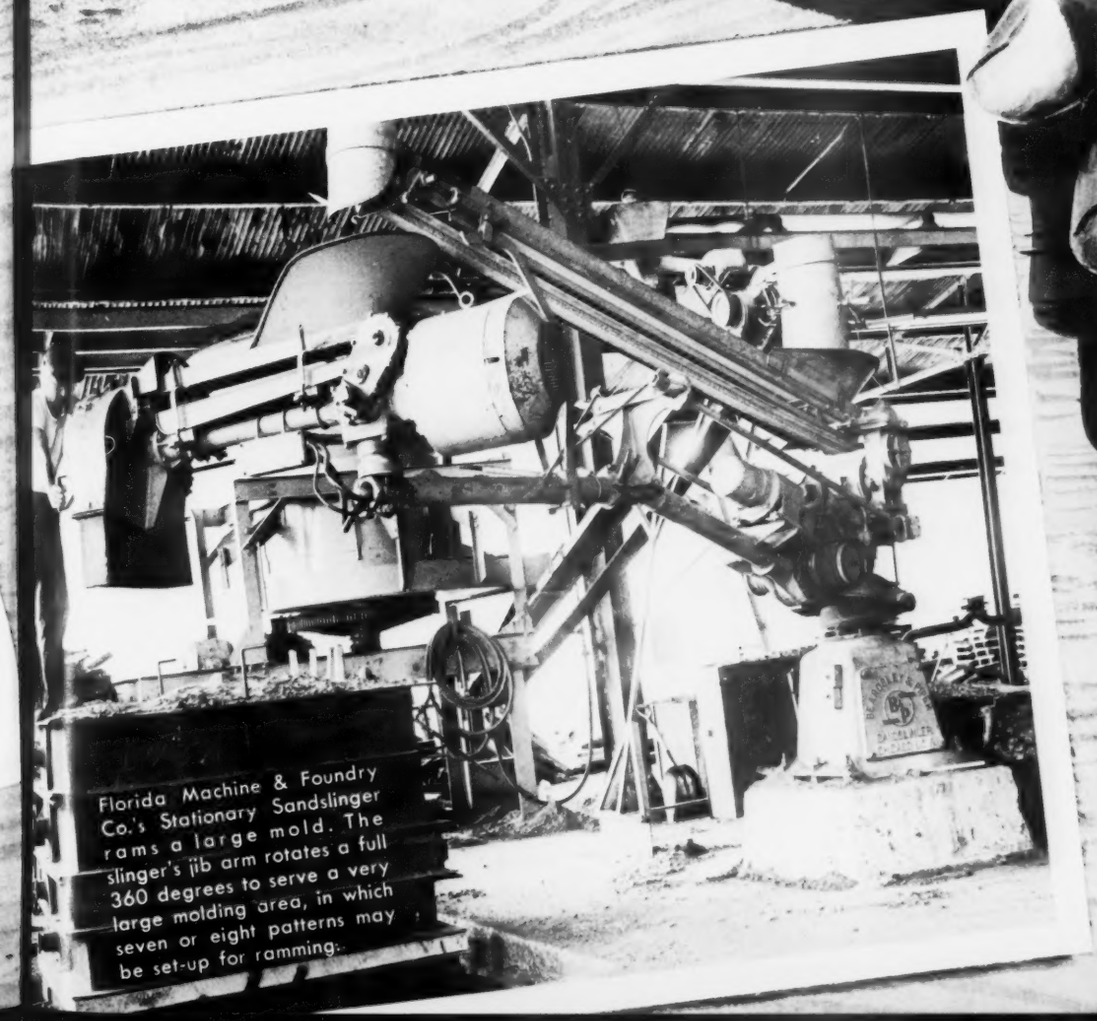
BEARDSLEY & PIPER

FOR BETTER METHODS

1952



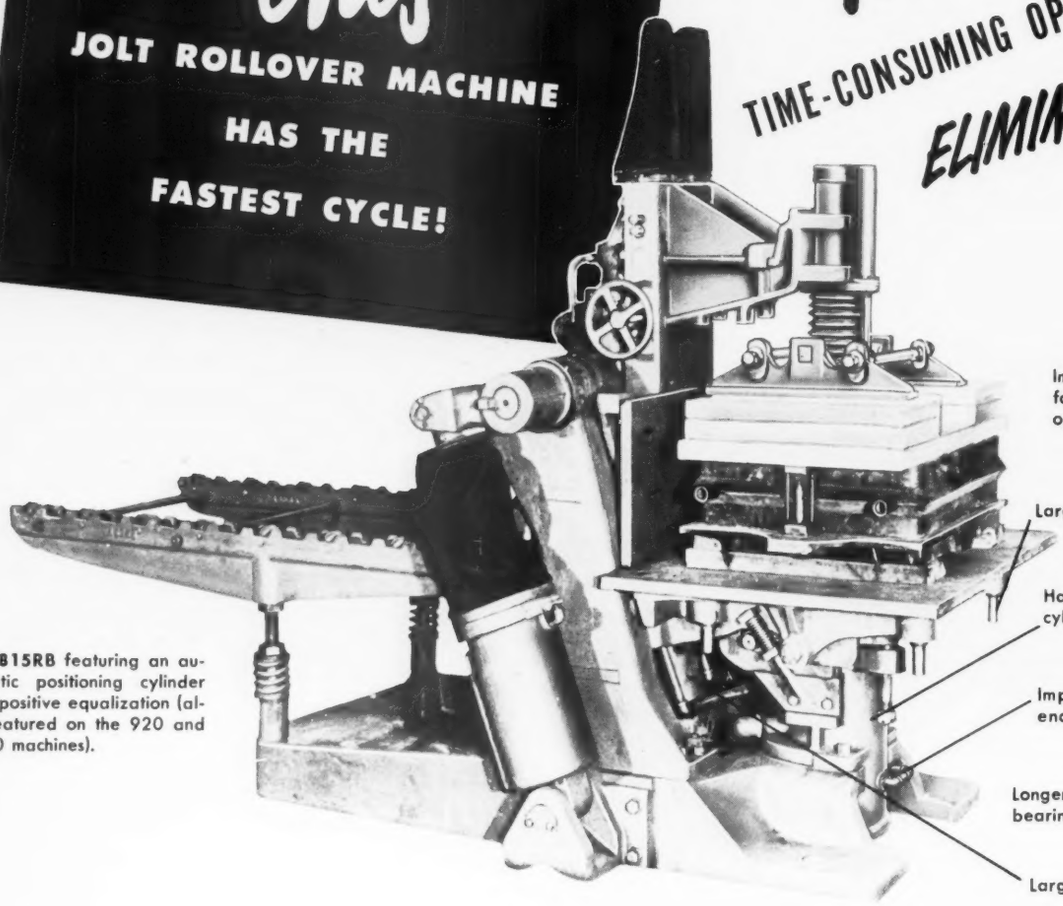
A smaller mold is rammed in the same ramming area. The slinger is supplied with a constant supply of mulled sand by the B&P Roto-Feed unit in the background.



Florida Machine & Foundry Co.'s Stationary Sandslinger rams a large mold. The slinger's jib arm rotates a full 360 degrees to serve a very large molding area, in which seven or eight patterns may be set-up for ramming.

this JOLT ROLLOVER MACHINE HAS THE FASTEST CYCLE!

TWO TIME-CONSUMING OPERATIONS ELIMINATED!


Improved valve manifold design—faster operation.
Larger, longer guide pins
Hardened and ground jolt cylinder guides
Improved jolt control—enclosed internal porting
Longer jolt cylinder—30% more bearing area
Larger rollover piston rods

The **815RB** featuring an automatic positioning cylinder and positive equalization (also featured on the 920 and 1020 machines).

Why the fastest cycle? Because in the Johnston & Jennings rollover cycle, two time-consuming operations have been eliminated. After rollover, it is unnecessary to raise a separate draw cylinder and equalize. Also eliminated is the unclamping operation necessary in the standard rollover cycle. Clamping and equalizing operations are combined in the downward stroke of a single double-action clamp and draw cylinder. Then, after rollover, this same cylinder draws the mold on its reverse stroke. No transfer of the mold load—no clamping and unclamping necessary. No pits are required for the installation of these machines. Today's rapidly changing production picture may necessitate changes in your foundry layout at any time . . . and a pit can't be moved. Use a Johnston & Jennings jolt-rollover-draw for your toughest production molding job, or use it as a rollover-draw machine in conjunction with a Sandslinger or Speedslinger. It pays to investigate . . . write today for complete information.

Johnston & Jennings
Jolt Rollover Pattern-Draw Machines

Model	Table Size	Pattern Draw	Capacity
612	24″x30″	12″	600#
815	30″x40″	15″	1200#
920	44″x54″	20″	2000#
1020	50″x60″	20″	3000#

All J & J Rollovers are open end and therefore do not limit the length of flasks used.

JOHNSTON J&J JENNINGS

AN IMPROVED LINE!

- Jolt-Rollover-Pattern-Draw • Jolt-Stripper or Pin-Lift
- Jolt-Squeeze • Jolt-Squeeze-Pin-Lift
- Plain-Air-Jolt

MOLDING MACHINE DIVISION
THE JOHNSTON & JENNINGS COMPANY
Division of Pettibone Mulliken Corp.
2424 North Cicero Ave., Chicago 39, Illinois

Annual Doehler Award Goes to David Laine

The annual Doehler award, highest award of the die casting industry, has been made to David Laine, secretary of American Die Casting Institute Inc. It recognizes his work in the conception and development of such of the institute's recent achievements as the certified zinc alloy plan and the industry's safety manual, his liaison work with other technical and trade associations and his work as "administrative officer for a major segment of the American die casting industry."

Presentation was made by Austin Lillegren, president of the institute and vice president of Madison-Kipp Corp., Madison, Wis., at a banquet which was a highlight of the institute's two-day meeting at the Edgewater Beach Hotel in Chicago last month. A cash honorarium of $1000 goes with the award, which is made possible by a fund set up in 1949 by Doehler-Jarvis Corp., Toledo, O.

Mr. Laine is beginning his tenth year as secretary of the Institute and has served during the period of the organization's growth from 30 members to a membership of 89 companies which operate 100 contract die casting plants.

Principal speaker at the award banquet was Verne H. Schnee, executive director of Minerals and Metals Advisory Board, National Academy of Sciences, who discussed "The Critical Situation in Metals and a View of the Future." Technical sessions during the two days covered safety in the industry, comparisons of zinc and aluminum die castings, statistical quality control, production problems and metal flow characteristics.

How To Cut Costs with Suggestion Systems

How small manufacturing concerns can use an employee suggestion system to cut costs, increase efficiency and build better relations between management and employees is explained in a new booklet issued by the Small Defense Plants Administration.

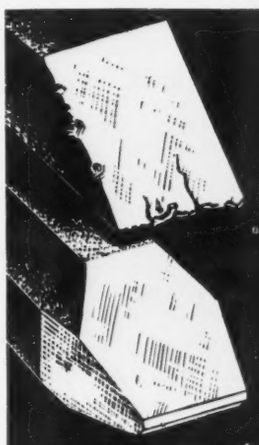
The booklet, "An Employee Suggestion System", is a revision of a similar booklet originally issued by the Department of Commerce, and tells of the basic principles for successfully starting and operating a suggestion system. It warns of various pitfalls to avoid, and gives examples of the types of suggestions which have been submitted by workers in various industries.

How the small manufacturer can draw upon the ingenuity of the workers in his plant is explained in the 19-page booklet, which may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 15 cents (do not send stamps).

Book Review

Handy Tolerance Tables, by Alexander Michael Sr., paper, 4 x 5½ in., published by Handy Length Book Co., 3507 Seventeenth St., S. W., Canton, O. Price $2.

Designed to save time by minimizing figuring, this booklet is divided into two parts. The first section is made up of 14 tables devoted to standard industrial fractions and decimal equivalents to three places with tolerances for from plus or minus 0.01 to plus or minus 0.25. Part two contains 14 tables of machining tolerances to two decimal places and nearest fraction with the difference to three places and tolerances from ±0.01 to ±0.25. A localizer chart eliminates error in reading by blocking out all but the desired figures.



Half-Cracked Tools *Give You* Half-Cracked Results

How long would the fragile cracked chisel last on a job? Most grit fails quickly, too.

HERE'S WHY! All grit is made by crushing shot. How you crush it makes the difference. Ordinary methods twist and pull the material during crushing. Result—half-cracked grit loaded with worthless awkward shapes. In use, particles breakdown quickly and cannot do a first-rate cleaning job.

On the other hand, the Ball Mill method produces fracture-free grit. The solid chunky particles can take plenty of hard knocks. Why?—because the Ball Mill crushes with a direct solid impact—no pulling or twisting. Industrial uses the Ball Mill process *exclusively*. IMA Ball Mill Grit does a better job longer.

WANT PROOF? Attach coupon to your letterhead and mail today. We'll send you a sample to compare with the grit you're using.

INDUSTRIAL METAL ABRASIVES CO.

Manufacturers and Distributors of Heat Treated Chilled Shot and Grit, Cold Drawn Steel Shot, and Malleable White Iron Stars.

1603 WILDWOOD AVE. • JACKSON, MICH.

SHOW ME!! Send sample of IMA Ball Mill Grit size_____

NAME_____ TITLE_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Industry BRIEFS

VANADIUM Corp. of America, 420 Lexington Ave., New York 17, has a system of color-coding shipments of alloys and metals to speed identification, handling, inventory and checking. Lables are used for drums, cards for freight cars and tags for bags. One color is assigned to each major alloying element, and the names of the elements are printed in large, bold type to provide a double check.

* * *

Eclipse Fuel Engineering Co., Rockford, Ill., will use the name "Eclipse" to identify all gas and oil-fired industrial appliances it manufactures. To simplify product recognition, all products formerly marked under the McKee name will bear the new trademark.

* * *

Roura Iron Works, 1404 Woodland Ave., Detroit 11, has under construction a 5520 sq ft addition to its plant which will be used for manufacturing and storage. The company manufactures self-dumping hoppers.

* * *

Russco Foundry Corp. has been formed in Milwaukee with an authorized capital of 1250 shares of common stock. Incorporation papers were signed by Chester J. Niebler, the registered agent, 744 North Fourth St., Milwaukee 3.

* * *

Hooker Electrochemical Co., 60 East 42nd St., New York, is opening a new sales office at 1 North La Salle St., Chicago, to serve its Midwest customers. Charles Y. Cain, Hooker's sales representative in the Chicago area since 1945, has been named district sales manager, and Donald McKechnie, who has been in the company's main office for several years, will be Chicago office manager.

* * *

Foundry Division, General Machine Co. Inc., Emmaus, Pa., celebrated its fifth anniversary on July 30. Twenty-two of the employes who worked for the firm on the day it began operations are still with it and were honored on the anniversary.

* * *

Dee Brass Foundry Inc., 2408 Everett St., Houston 9, Tex., has filed articles with the office of the secretary of state increasing its capital stock from $100,000 to $150,000.

* * *

Purdy Co., Railway Exchange Bldg., St. Louis, has bought the St. Louis office and the Madison, Ill., scrap yards of Hickman, Williams & Co. C. F. Harding, formerly in charge of the Hickman, Williams scrap department, will join the Purdy organization.

* * *

Mir-O-Col Alloy Co. Inc., 340 North Avenue 21, Los Angeles 31, has erected a new 8000-sq ft foundry and office building to expand its present production of precision steel and alloy castings. Employing the "hot ceramic mold technique" method developed by John Skoning, foundry manager, the firm produces castings said to be held within tolerances of 0.001 in. per inch.

* * *

A new car type of oil and gas fired heat treating furnace being installed at National Roll & Foundry Co., Avonmore, Pa. will increase the company's heat treating capacity for production of rolls, commercial castings and tank armor castings. Rust Furnace Co., 575 Sixth Ave., Pittsburgh, is making the installation.

* * *

H. Hirschfield Sons Co., Bay City, Mich., has erected a 7700-sq-ft. foundry for its Modern Metals Foundry Division. The new shop is equipped with 25-ft runways for two cranes, each with 10-ton capacity, and has a rigid steel frame and steel coverings. The Luria Engineering Co. designed and constructed the new plant.

* * *

Geo. P. Reintjes Co., 2517-19 Jefferson St., Kansas City 6, Mo., has appointed R. D. Osgood as sales representative in the Birmingham and Atlanta areas. Mr. Osgood, associated with Harry G. Mouat, 544 American Life Bldg., Birmingham 3, retired recently as chief engineer of Tennessee Coal & Iron

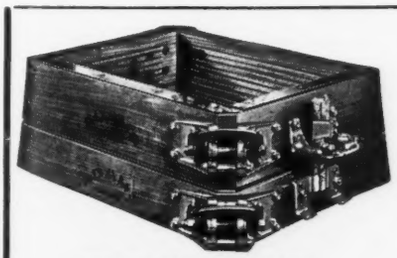
(*Concluded on page* 172)

MILLION DOLLAR PLANT: Benj. Harris & Co., Chicago Heights, Ill., has completed its new million dollar plant on ten acres of land at Eleventh and State Sts., Chicago Heights. When a fire burned out a large portion of the company's buildings on May 8, 1950, work was immediately started on a major rebuilding and expansion program, completion of which coincides with the celebration of the firm's 50th anniversary. This general view of inside of the plant shows piled stacks of ingots

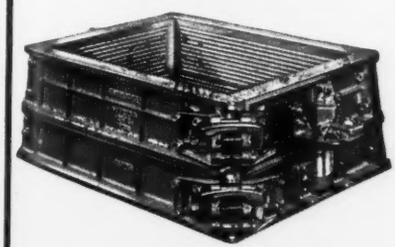
REDUCE YOUR COSTS

ADAMS

CAST IRON OR CAST ALUMINUM JACKETS



CHERRY EASY-OFF FLASK



ALUMINUM EASY-OFF FLASK

Look at these features and you'll agree that the Adams line can mean economy, efficiency, and better molds for your foundry.

Above is the Adams jacket available in either cast iron or cast aluminum. They are cast from a top grade metal mixture best suited for their purpose. The sturdy construction as a result of the vertical ribs inside and horizontal ribs outside plus the handles at either end assure you of long life for this equipment and ease in handling. These jackets afford you MAXIMUM STRENGTH with MINIMUM WEIGHT.

Here are jackets that assure you perfect mold fit—will give you the greatest strength while under pouring strain—allow for free flow of gases all because of INSIDE CORRUGATIONS. These VENTILATED Jackets are first choice in foundries across the nation.

Look into the advantages cast iron or cast aluminum can offer you depending upon your foundry needs. We will be happy to make recommendations to fill your requirements.

The ADAMS Company

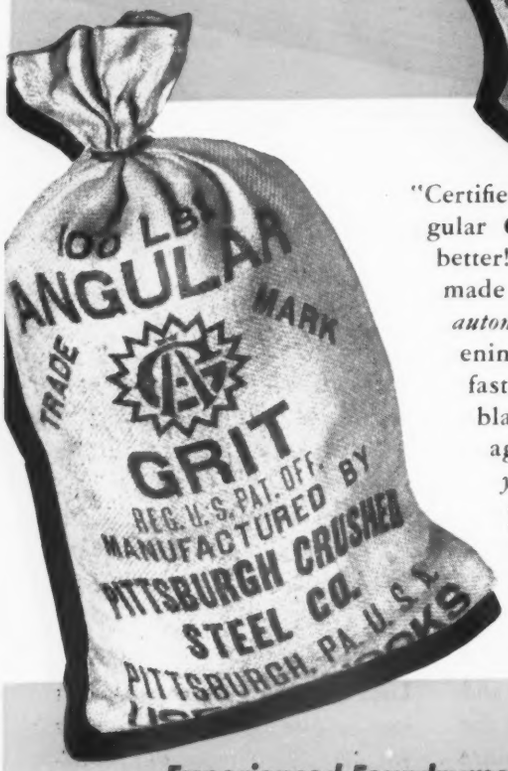
ESTABLISHED 1883

DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT

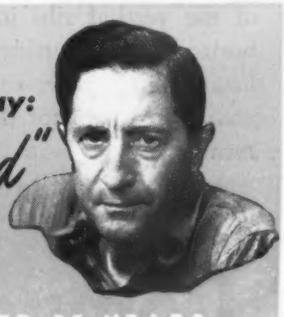
CERTIFIED ABRASIVES

CLEAN and CLEAN and CLEAN and CLEAN!



"Certified" Samson Shot and Angular Grit wear longer, clean better! That's because they're made *extra-tough* by a special *automatically controlled* hardening process that assures you fast, efficient, high-quality blast cleaning over and over again. Try "Certified" in *your* cleaning room and you will discover why it is the *first choice* in hundreds of foundries.

All sizes graded to SAE specifications.



Experienced Foundrymen say:

"Always specify Certified"

ACCEPTED AND USED FOR OVER 55 YEARS

PITTSBURGH CRUSHED STEEL CO.
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MEMBER FEMA

STEEL SHOT AND GRIT CO.
Boston, Mass.

(Concluded from page 170)

Co. He will handle sales of arches for open hearth furnaces, soaking pit roof covers and heat treating furnaces for steel and allied industries for Reintjes Co.

* * *

Skilsaw Inc., 5033 Elston Ave., Chicago 30, has changed its name to Skil Corp., as of Oct. 1. The change was made because the firm has expanded its product line during its 28-year history from one portable electric saw to over 150 different tools, including drills, sanders, grinders, drivers and polishers.

* * *

Reichhold Chemicals Inc., 630 Fifth Ave., New York, plans to manufacture and market powdered phenolics for a wide variety of industrial applications, including molding compounds, foundry shell molds and cores, brake linings, grinding wheels and wood waste products.

* * *

Washington Iron Works Inc., Williamsville, N. Y., has been granted a charter of incorporation which lists capital stock of $20,000. The directors are Francis E. Kerwin, 8 Bidwell Pkwy., Buffalo, and Hilda O. Rosenow and Albert W. Rosenow, both of 151 South Ellicott St., Williamsville, N. Y.

* * *

Wedron Silica Co., Wedron, Ill., producer of glass and foundry sands, has increased its production facilities from 2000 tons daily to 2500. It is one of several firms which mine and process silica from deposits in the vicinity of Wedron and Ottawa in northern Illinois.

Book Review

Basic Open Hearth Steelmaking, cloth, 940 pages, 6 x 9 in., published by the American Institute of Mining and Metallurgical Engineers, New York. Price $8.

This second edition of a well known work has been completely revised by the Physical Chemistry of Steelmaking Committee of the Iron and Steel Division, AIME. It has been enlarged from the original 632 pages to the present 940, and from 19 to 22 chapters.

The contents are divided into two sections—practice, and principles. The first part, written in simple language, describes the furnace structure and gives a broad outline of the process. Then the steelmaking process is discussed step by step.

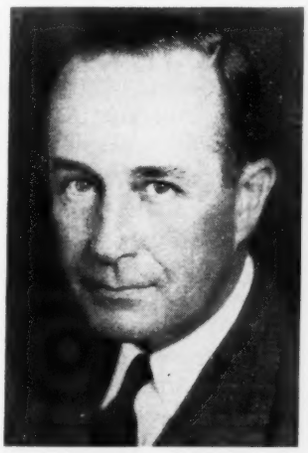
Second part of the book deals with the basic scientific and engineering principles underlying the open-hearth process.

OBITUARY

PAUL F. NYDEGGER, 77, former plant superintendent, Singer Mfg. Co., Elizabethport, N. J., died Aug. 10, in Truckee, Calif. Mr. Nydegger, a native of Switzerland, worked in textile machinery plants there and on his arrival in United States joined the sewing machine company as a toolmaker. He served in successive positions and was plant superintendent upon his retirement 3 years ago, following 51 years of service. While in the Singer Co.'s employ he was graduated from Newark Technical School and Cooper Union. In 1912 he was sent to Wittenberg, Germany as superintendent of the Singer factory there. He returned to this country in 1919, and served at the company's Canadian factory, until the following year when he was made superintendent of the Elizabeth plant.

* * *

Max F. Becker of M. F. Becker & Associates, Chicago, died there Aug. 28, following a short illness. Mr.



MAX F. BECKER

Becker was graduated from Purdue University in 1920, when he joined Whiting Corp., Harvey, Ill. While there he became manager of the foundry equipment division, sales manager of the industrial division and in 1940 was named vice president. He left Whiting in 1946 and formed his own company to serve as manufacturers' representative for the foundry and other industries. He was a former director of Foundry Equipment Manufacturers Association.

* * *

Eugene Adams, 91, president, the Adams Co., Dubuque, Iowa, maker of molding machines and flask equipment, died Aug. 8. Mr. Adams was born in Dubuque and left school at 18, and for several years was a mem-

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SHELTON, CONN.

ber of a surveying crew which laid out townsites and railroad rights of way in Minnesota. He studied engineering at University of Iowa and in 1884 bought an interest in the Roberts & Langworthy Iron Works, which later became the Adams Co., with Mr. Adams and his brother, Herbert, as partners. When the plant was destroyed by fire in 1892 it was moved to its present site on East Fourth St., Dubuque.

* * *

Royston T. Covington, 57, formerly superintendent of the American Hammered Piston Ring Division, Koppers Co., Pittsburgh, died Sept. 4. Mr. Covington had been operating his own company, Covington Motor Co., Bethesda, Md., since 1945, when he left Koppers Co. He was one of the organizers of the Chesapeake Chapter of the American Foundrymen's Society and was its chairman in 1943-44. He maintained his interest in chapter activities after leaving the foundry industry.

* * *

Daniel Eisenhauer, 70, part owner of the former Duplex Pattern Co., Cleveland, died Aug. 22. Mr. Eisenhauer, a native of Cleveland, was one of the city's pioneer patternmakers. He retired in 1948, and the company was disbanded.

* * *

J. G. Wilson, 75, for 35 years owner of the Sheffield Machine & Foundry Co., Sheffield, Ala., died recently. Mr. Wilson retired in 1944.

* * *

S. D. McKenzie, 65, manager of Western Foundry & Stove Repair Works, Salt Lake City, Utah, died Aug. 21.

Book Review

The Development of Executive Talent, edited by M. Joseph Dooher and Vivienne Marquis, cloth, 576 pages, 6 x 9 in., published by American Management Association, New York. Price $6.75 ($5.75 to AMA members).

Industry's growing concern with the problem of developing management and executive personnel has prompted the American Management Association to bring together in one volume the material on management development printed in *Personnel* during the past two years and to supplement it with papers presented at AMA conferences. Thus this book is actually the work of over 40 men, most of them from industry, but a few with academic and government backgrounds.

These men describe a large variety of approaches and techniques.

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Program Is Set for Fifth Metals Casting Meeting

Continuing the series of successful Metals Casting Conferences, the fifth annual meeting will be held at the Memorial Union Building on the Purdue University campus, Oct. 30-31. Arrangements have been made through the co-operation of the Michiana and Central Indiana Chapters of AFS and the Department of General Engineering, Division of Adult Education, Purdue University.

Chairman of the conference committee is Lewis D. Reiff, Superior Malleable & Steel Castings Co., Benton Harbor, Mich.; program chairman is James Barrett, National Malleable & Steel Castings Co., Indianapolis.

The conference schedule follows:

Thursday, Oct. 30

9 a.m.—Registration.

10 a.m.—"A Conference for the Casting Industry," by Dean A. A. Potter, Schools of Engineering, Purdue University, and I. R. Wagner, Electric Steel Castings Co., Indianapolis, and president, AFS; "Buyer's Viewpoint," by Joseph P. Stanton, buyer, Ford Motor Co., Detroit. Chairman—H. A. Bolz, head of Department of General Engineering, Purdue University.

1:30 p.m.—"Present and Future of the Casting Industry," by Frank G. Steinebach, editor, FOUNDRY, Cleveland. Chairman—Prof. R. W. Lindley, Manufacturing Processes, Purdue University.

3 p.m.—"Foreman's Part in Better Castings," by Robert Franck, Superior Malleable & Steel Castings Co., Benton Harbor, Mich. and E. Crowell Knight, Ross Gear & Tool Co., Lafayette, Ind. Chairman—W. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.

6:30 p.m.—Banquet.
"Building for Tomorrow," by Dr. Alfred P. Haake, consultant to General Motors Corp., Park Ridge, Ill. S. D. Martin, Central Foundry Division, GMC, Danville, Ill., will introduce the speaker. Charles C. Spencer, Electric Steel Castings Co., Indianapolis, will be toastmaster. Entertainment will be provided by J. F. Lindley and R. W. Lindley and "Doc" Walkey, duo-piano team.

Friday, Oct. 31

10 a.m.—"What Quality Control Means to Engineering and to Buyers of Castings," by O. K. Hunsaker and Ed Price, Dayton Malleable Iron Co., Ironton, O. Chairman—Allen A. Evans, International Harvester Co., Indianapolis.

11:15 a.m.—"Shell Molding," by W. S. Walters, LaGrange Shell Molders Inc., Lagrange, Ind. Chairman—H. L. Day, Auto Specialties Mfg. Co., St. Joseph, Mich.

1:30 p.m.—"Materials Handling in the Foundry," by K. F. Lange, Link-Belt Co., Chicago. Chairman—B. E. Gavin, National Malleable & Steel Castings Co., Indianapolis.

3 p.m.—Operation of baby cupola in the University's laboratory by Foundry Educational Foundation students.

GMC Expands at Danville

Expansion of the Central Foundry Division plant of General Motors at Danville, Ill., will include a new core department with new ovens and improved sand mixing and handling equipment, an increase from two to four molding lines, a redesigned shakeout system for better handling and more efficient cooling of castings, five additional annealing kilns and two 112-in. cupolas and a 15-ton electric furnace which will double melting capacity. Eventually 400 new employees will be required.

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Apex Flux cleanses molten aluminum alloys of oxides and non-metallic material present when remelting foundry scrap and helps dispel gases—a factor in producing sound homogeneous castings having the ultimate in mechanical and physical properties; improved machinability and polishing characteristics. No smoke or fumes, odorless, does not absorb moisture.

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PROPOSED TENTATIVE SPECIFICATIONS FOR CHILLED AND WHITE IRON CASTINGS

ASTM Designation: A—-52T

Issued, 1952

Scope

1. These specifications cover the following types of castings:

Type A.—Castings made of iron which, when cast against a chiller, have a surface free of graphitic carbon; the balance of the casting consisting of mottled and gray iron.

Type B.—Castings which are free from graphitic carbon as-cast due to selected chemical composition.

Physical Properties for Chilled Portion of Castings

2. (*a*) A transverse test on a bar cast in accordance with Fig. 1 shall be considered the basis for qualification of the chilled portion of the casting. The qualification value shall be agreed upon between the manufacturer and the purchaser and shall be stated in terms of the modulus of rupture calculated as follows:

$$\text{Modulus of rupture} = \frac{2.546LS}{D^3}$$

where:

L = Span length, or distance between supports, in inches,
S = breaking load, in pounds, and
D = diameter of the bar, in inches.

where:

(b) The test may be made either on the bar as-cast, or ground to an outside diameter of 0.875 in., as agreed upon between the manufacturer and the purchaser. Supports 6 in. apart shall be used.

(c) The test result shall be based on the average of two or more bars cast from the same ladle of iron.

Physical Properties for Gray Iron Portion of Casting

3. (*a*) A tension test, where possible, shall be considered the basis for qualification of the essentially gray iron portion of the casting. The qualification value shall be agreed upon between the manufacturer and the purchaser. The tension test specimen shall be obtained from a step test bar, cast in accordance with Fig. 2, from the section having the approximate Brinell hardness of the gray iron section of the casting. Either type B or

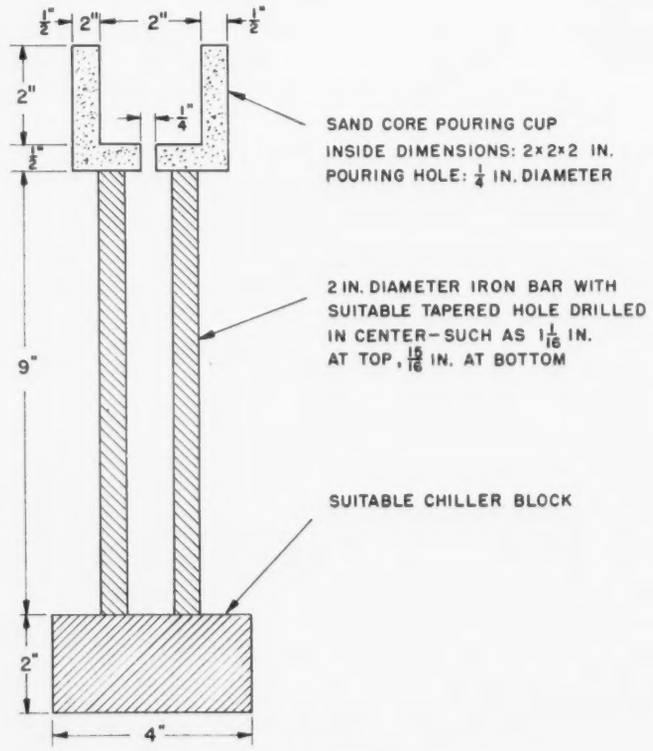


Fig. 1—Mold for transverse test bars

These tentative specifications have been approved by the sponsoring committee and accepted by the Society in accordance with established procedures, for use pending adoption as standard. Suggestions for revisions should be addressed to the society at 1916 Race St., Philadelphia 3, Pa.

PROPOSED TENTATIVE SPECIFICATIONS FOR CHILLED AND WHITE IRON CASTINGS

ASTM Designation: A——-52T

Issued, 1952

C specimens of the Standard Specifications for Gray Iron Castings (ASTM Designation: A 48) may be used.

Note.—It is recognized that the outside surface of a sand cast bar will have a skin that is harder than the material somewhat further removed from the surface, and accordingly the hardness value shall be determined on a cross-section of the bar from a location at which the tension test specimen is to be cut.

(*b*) In the case where it is impossible to machine a tension test specimen, due to the hardness of the material, a transverse test shall be considered the basis for qualification of the essentially gray iron portion of the casting. The qualification value shall be agreed upon between the manufacturer and the purchaser and shall be stated in terms of modulus of rupture calculated in accordance with Section 2 (*a*). The transverse test bar shall be cast in sand to dimensions of 27 in. in length and not over 3 in. in diameter, and tested on supports 24 in. apart. If a larger diameter bar is required, then the length to diameter ratio shall be approximately 8 to 1. The transverse test bars shall have at least ⅛ in. ground from their surface.

Test Bars

4. Test bars shall be cast separately from the castings, of iron taken from the same ladle used for the casting. The test bars shall receive the same thermal treatment as the castings. The size and shape of the pouring cup and the in-gate of the test bar, as indicated in Fig. 1, may be altered to suit the convenience of the manufacturer.

Chemical Composition

5. It is the intent of these specifications to subordinate chemical composition to physical properties, the chemical composition being left to the discretion of the manufacturer.

Methods of Testing

6. Tension and transverse test specimens shall be tested in accordance with the procedures described in the Standard Specifications for Gray Iron Castings (ASTM Designation: A 48).

Inspection

7. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., for a nominal sum.

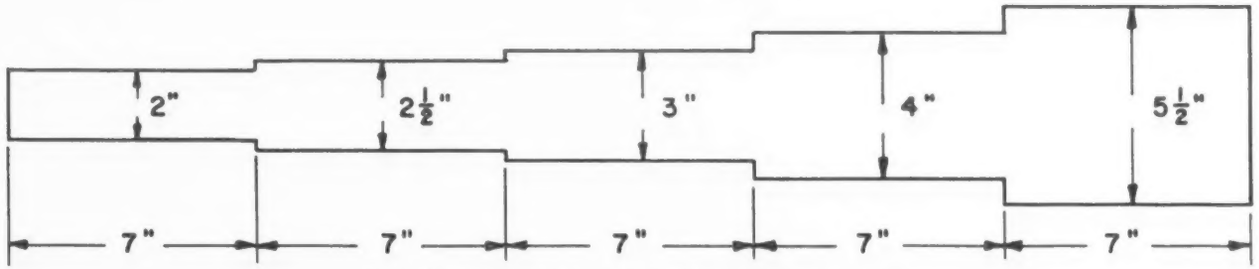
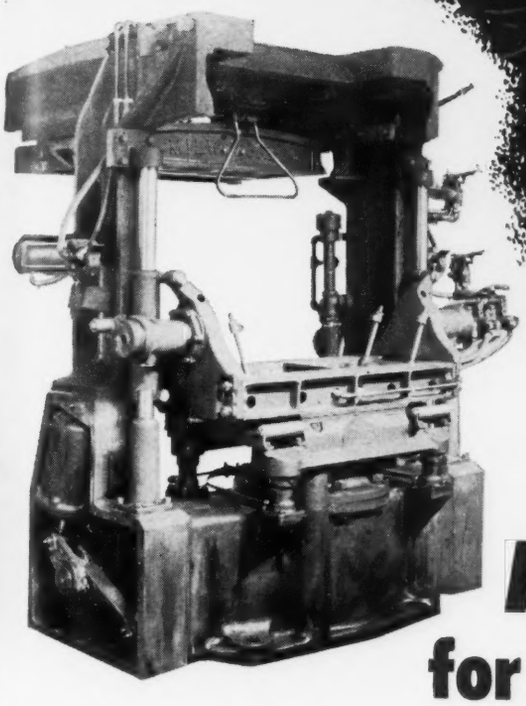
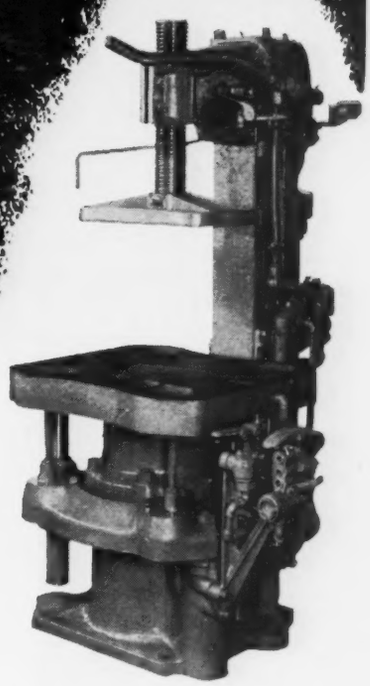


Fig. 2—Step test bar for tension test specimens





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This powerful machine combines jolt, squeeze, roll-over and pattern draw in the fastest and simplest possible operating cycle. The completed mold is on a roller conveyor which registers with a run-off conveyor so that the mold is quickly pushed away from machine . . . saves time and crane capacity. **MODEL 217** has a 24,000-pound squeeze and 1200-pound jolt on 80 p.s.i. pressure . . . handles flasks up to 41 inches long and 35 inches wide. Pattern draw is 12 inches. TWO OTHER MODELS HAVING JOLT CAPACITIES OF 1000 AND 1800 POUNDS ARE AVAILABLE.

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Mark Cleaner Air Week Oct. 20 to 26

Cleaner Air Week will be observed throughout the nation this year during the week of Oct. 20-26. With the co-operation of the United States Department of Commerce and many organizations actively interested in air pollution control, this week is being promoted to help the development of a united educational program for cleaner air.

Supporting this purpose, Secretary of Commerce Charles Sawyer told the Air Pollution Control Association, "We are in the midst of a tremendous industrial expansion—one which promises to continue at an impressive rate into the future. At the same time our traffic and population are steadily growing. Unless the proper precautionary measures are taken, this broad growth can only lead to increasing pollution of the air by smoke, dust, soot and fumes, representing a hazard to health and a grave source of economic waste."

He went on to say that "installation of equipment to reduce air pollution can prevent the waste of materials and energy, which the nation can ill afford, and cut down the cost of fuel, factory upkeep and maintenance and illness and absenteeism caused by noxious fumes."

Increased Capacity for Refractories Planned

Increased capacity for production of basic refractories and insulating fire brick refractories is planned by the Defense Production Administration.

The goal for basic refractories has been set at a capacity of 140 million nine-inch equivalent as of Jan. 1, 1954. This compares with an estimated capacity of about 75 million nine-inch equivalent at the beginning of 1951.

DPA said certificates of necessity for rapid tax amortization already issued are sufficient to fill the goal.

The goal for insulating fire brick refractories has been set at a capacity of 56 million nine-inch equivalent as of Jan. 1 1954. This compares with an estimated capacity of 42.8 million nine-inch equivalent as of Jan. 1, 1950. DPA said the goal has been almost met. The number of applications on hand but not yet processed for certificates of necessity is believed adequate to provide the remaining expansion.

Expansion goals provide the basis by which DPA's Office of Construction and Resources Expansion can assist in the achievement of the needed expansion through accelerated tax amortization or other means.

Book Review

Selling to Industry, by Bernard Lester, cloth, 255 pages, 5 x 7 in., published by Industrial Press, New York. Price $3.50.

This volume is designed to improve the performance of any engineer who sells technical products to industrial users. The author points out that although each sales situation calls for individual evaluation, success in selling is not a haphazard affair. There are key points which experience has proved to be most effective in the proper preparation of orderly, enthusiastic procedure. The book sets forth these points.

General discussions are backed up by brief case histories, descriptions of specific situations, and discussions of methods of handling them.

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1. Tighter, more uniform closure of mold halves; eliminates need for bolts and clamps.
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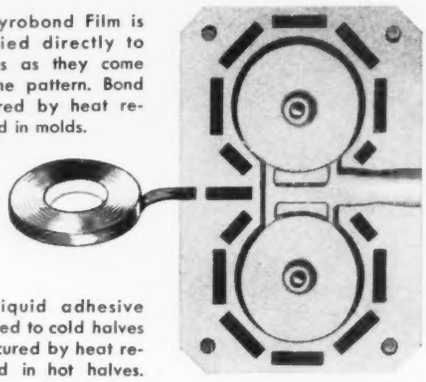
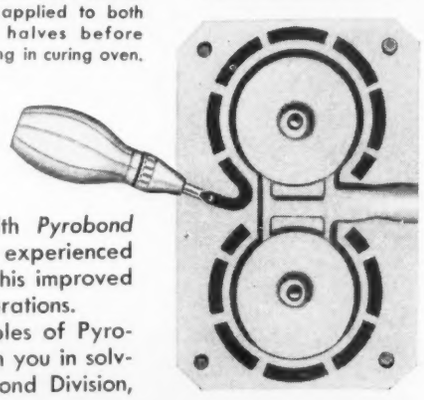
TWO methods of bonding molds with PYROBOND adhesive

1. Pyrobond Film is applied directly to halves as they come off the pattern. Bond is cured by heat retained in molds.



2. Liquid adhesive applied to cold halves and cured by heat retained in hot halves. Also applied to both cold halves before placing in curing oven.



The superior results obtained with *Pyrobond Adhesive* have been proved by experienced shell molders who are now using this improved sealing procedure in their own operations.

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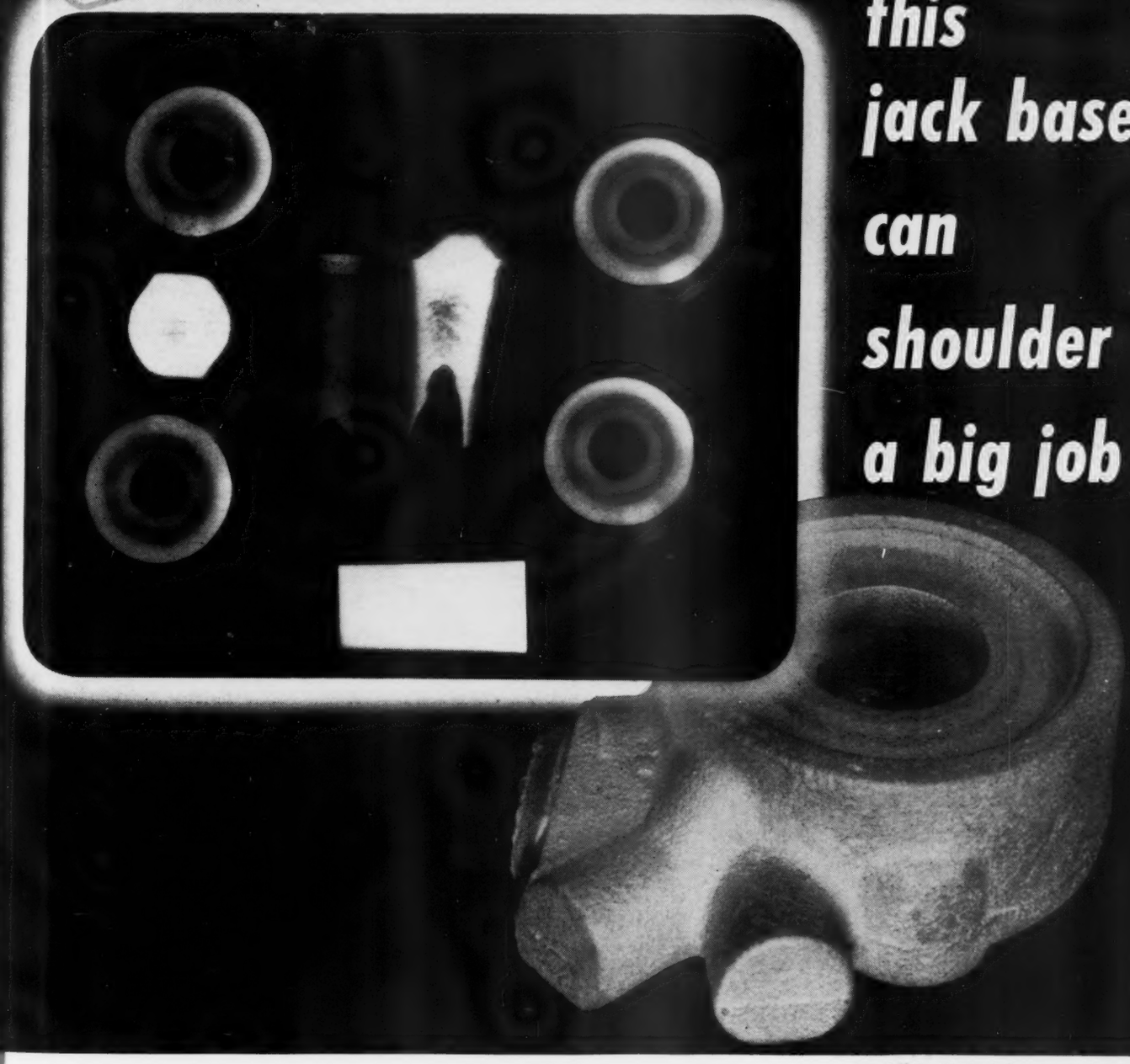

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Instances like this show why more and more foundries are making radiography routine. It is the way to be sure only high-quality castings are released.

If you would like to know how radiography can improve your plant operation, talk it over with your x-ray dealer. And, if you wish, we'll send you a free copy of "Radiography As A Foundry Tool."

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Universal Flask Pins and Bushings save precious minutes of production time because they assure instant, accurate alignment of cope and drag. And they also save down-time because, being heat-treated and precision ground from fine quality steels, they stand up under rough treatment and give long, satisfactory service. Universal threaded series Flask Pins and Bushings are used in steel, aluminum, magnesium or other light metal flasks. Bushings are available in both the round and elongated types; pins in both round and hexagonal types. Universal carries a complete line of sizes of its threaded series as well as its taper and plain series Pins and Bushings as regular stock items. For further information write to the Universal Warehouse nearest you — 1060 Broad St., Newark, N. J., 5035 Sixth Ave., Kenosha, Wisc., or the home office.

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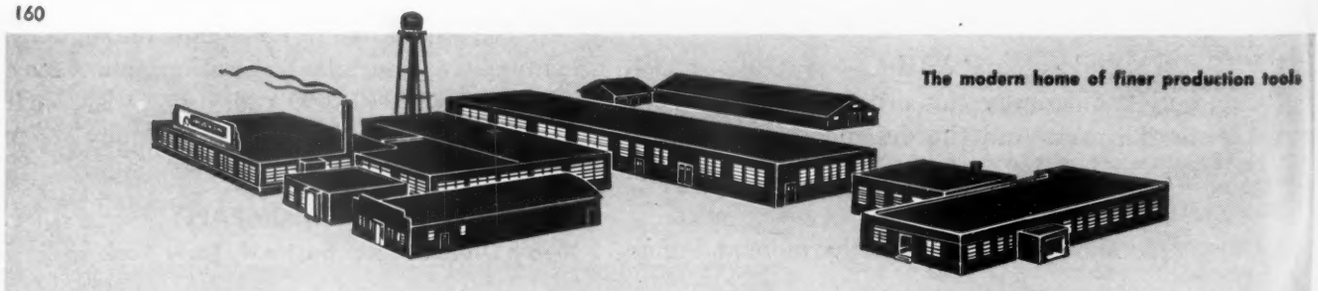


UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN

Coke Handled at Saving By Conveyor Unit

DONOVAN Inc., St. Paul producer of gray iron castings, has effected a considerable cost saving in coke and limestone handling through use of two portable, belt-type car-unloader and stockpiling units. At the recommendation of the Wm. H. Ziegler Co., Minneapolis, the foundry installed a Barber-Greene car unloader and portable belt conveyor.

Heretofore, Donovan received foundry coke by truck at a haulage cost of $1.40 per ton. The coke was dumped onto the plant stockpile and later rehauled by truck as required.

The basis for the saving with the new equipment lies in the considerable differential between the rates for truck and rail shipment. As opposed to the $1.40 per ton haulage cost by truck, the same material can be received in hopper-bottom railroad cars at a cost of $0.26 per ton.

Costs Fixed and Variable

Against this differential of $1.14 per ton is applied the additional cost of labor, fuel, lubrication, amortization, insurance, etc. for the equipment. Some of these costs are fixed and some are variable. The speed of operation of the units permits the unloading of a 30-ton car in a maximum of 1½ hours. Since the services of only one operator, actually an attendant, is required, the labor cost adds only 7 cents per ton to the cost.

Retirement of the investment in the machines, insurance, fuel, lubrication, etc., can only be computed by formulae established from experience in the field. Using such tables, it can be estimated that these costs add not more than 27 cents a ton to the operation.

The total cost for handling using the B-G equipment, appears to be about 60 cents per ton, thus permitting a saving of 80 cents per ton over the truck-haul method.

Donovan's annual consumption is approximately 4160 tons of coke, plus a car of limestone per month. This limestone was formerly unloaded by a crane at a cost of $7.75 per car. Now, using the conveyor team, the cost has been cut to about $1.35 per car. Adding this $6 per car saving, or a yearly total of $72, to the coke economies makes a total per year of more then $3300. Increased annual output will decrease the per-ton cost, thus effecting additional economy.

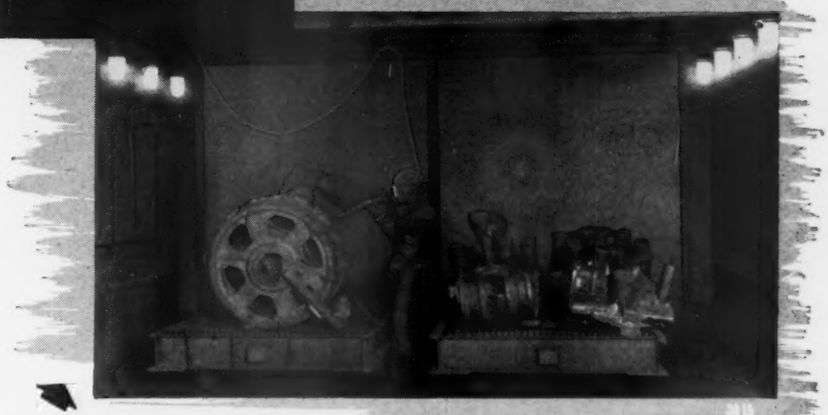
The two conveyor units were originally designed to speed unloading of aggregate materials — sand, gravel, stone, etc. from hopper-bottom cars. The need for a low-cost, portable team for foundries and other plants faced with coke unloading problems brought the slight modifications necessary for efficient work in this field.

This model unloader is equipped with a unique belt and chain arrangement. The belt provides an abrasion-resistant carrying vehicle and is at-

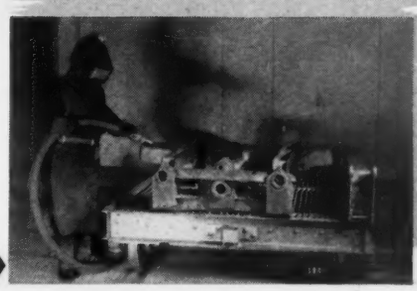
(*Concluded on page* 186)

The two portable, belt-type car-unloader and stockpiling units are shown here in operation at the gray iron foundry of Donovan Inc. located at St. Paul

SLY ARMOURED* BLAST ROOMS



A 16′ x 16′ Sly Blast Room with double track for two cars. Both cars can be used for a single large casting. Note how perforated floor plates keep coarse refuse from entering hopper below.



This view shows a Sly Blast Car in a Sly Blast Room. Perforated floor plates are supported by grating preventing plates from warping. Observe how tops of rails are flush with floor. Operator wears a Sly "Purair" Helmet.

Whatever Size Your Castings

And whatever your tonnage we have a standard blast room to suit. We have built blast room equipment for the cleaning of the inside of tank cars, for large airplane fuselages, for structural assemblies, tanks, railroad cars and locomotives. Some large blast rooms are self-contained buildings.

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Inside width: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft. • Inside Length: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft. Inside Height: 7 ft. 3 in., 8 ft. 3 in., 9 ft. 3 in. • Larger Blast Rooms for special purposes.

***ARMOURED** An extra layer of detachable 3/16" steel wear plates to protect the walls. • An extra layer of steel grating to reinforce the floor against sagging. (Exclusive Sly features)

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Osborn Rota-Lift's re

This Osborn ROTA-LIFT installation produces complete molds 16 to 20 inches wide and 30 to 48 inches long . . . *nine times faster than before.*

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lts speak louder than words

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One molder...no helper

Hines Flask Company reports these savings from installations of Osborn Rota-Lifts

ROTA-LIFT has *increased production per man hour 9 times.* Molds ranging from 16 to 20 inches wide and 30 to 48 inches long were formerly produced at a rate of 20 per day with one molder and helper. After Rota-Lifts were installed, production increased to *90 molds per day* using one operator and the same flask and matchplate pattern equipment.

Osborn ROTA-LIFT eliminates heavy manual effort by mechanizing the jolt, rollover, squeeze, cope draw and closing operations. One man operating one machine makes complete molds from large matchplate patterns. ROTA-LIFT handles a wide range of flask sizes . . . normally can be set up for rapid change of short run jobs using existing pattern equipment.

Perhaps similar savings can be duplicated in your foundry. Have an experienced Osborn molding specialist survey your needs and recommend the most modern, efficient equipment from Osborn's complete line of molding machines and core blowers. Call or write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

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MOLDING MACHINES CORE BLOWING MACHINES INDUSTRIAL BRUSHES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

(*Concluded from page* 183)

tached on both sides to a chain drive which gives positive and constant flow even under the most severe surge loads.

Book Review

Foundry Sand Handbook; sixth edition 1952; 265 pages 6 x 9 in.; published by the American Foundrymen's Society, 616 South Michigan Ave., Chicago 5; price $5.25.

This sixth edition reflects the vast amount of work involved and the progress achieved since the Committee on Standard Tests of the AFS Foundry Sand Research Committee published a set of tentative standards for determining moisture content, strength, permeability, fineness and chemical analysis in 1924. In 1928 the committee approved revisions and elaborations and grading classification. A third revised edition was issued in 1931. A fourth edition, further revised, was issued in 1938. The fifth edition appeared in 1944.

Subject matter in the present edition is presented in 23 sections: Introduction; mode of occurrence of sands and clays; methods for sampling foundry sands and clays; preparing foundry sand mixtures for testing; methods for determining fineness; determining moisture content; determination of permeability; strength of foundry sand mixtures; method for determination of green surface hardness; determining sintering point; elevated temperature tests; chemical analysis; tentative method for testing core binders; mechanical properties of core sand mixtures; method for determining strength of core paste; nonstandard tests; interpretation of room temperature sand tests; maintenance of testing equipment; molding sand mixtures for ferrous and nonferrous metals.

The book concludes with a 13-page glossary of terms used in foundry sand work, a 44-page bibliography of articles which have appeared in American and foreign publications; a 6-page subject index and 4 pages of conversion tables.

Magnesium Fire Control

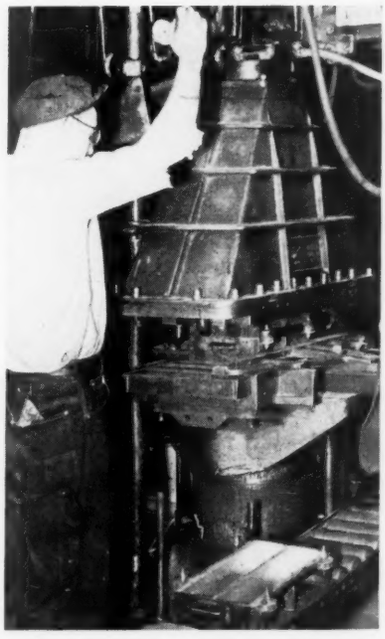
How to avoid and control magnesium fires is exhaustively dealt with in "Standards for Magnesium," a 16-page pamphlet just released by the National Fire Protection Association. This booklet presents sound practical measures for the control of magnesium fires, which thrive on such standard extinguishing agents as water and carbon tetrachloride. The general purpose of the booklet "is to call attention to the fire and explosion hazards in the storage, handling and processing of magnesium alloys . . . and to emphasize the measures that can be adopted for control."

Directed toward foundries, processing plants and commercial storage facilities, the pamphlet introduces the subject in concise outline form by describing the properties of magnesium, spot tests for its detection, and details of its combustibility and explosibility. It may be purchased for 25 cents from the National Fire Protection Association, 60 Batterymarch St., Boston 10.

How To Do It . . .

Cores Are Blown at Ends Through 90-Degree Elbow

By L. D. PRIDMORE, International Molding Machine Co., La Grange Park, Ill.
as told to ROBERT H. HERRMANN, *FOUNDRY*



THIS CORE blowing machine is rigged to blow sand through 90-degree elbows into the ends of a corebox. The cores produced are cylindrical in shape, and the sand is blown into the ends of the cylinders. Major advantage in blowing these cores through a 90-degree elbow is that the cores do not have to be slicked after they are blown. A cut-off plate, located in the cope half of the corebox at the blowholes, nips the sand off neatly.

In the two-man installation shown here, the corebox is blown simultaneously at both ends through openings in the cope half of the box which is mounted on the machine blower plate. Two loose corebox drag halves are used to keep production moving smoothly and continuously. Notice the short roller conveyor at lower right for return of empty half of corebox to the operator who blows the cores. The operation must be timed so the box half rolls back when the machine is in blowing position with the second drag box in place.

Man in left foreground places empty drag on the machine and blows the cores. After the blow, the base plate of the machine is lowered hydraulically, the sand neck at the blowholes being automatically and cleanly nipped off by the cut-off plate in the cope. A man behind the machine pulls out the drag, places a drier on the blown cores, rolls the assembly over, and places drier and core on baking rack, returning the empty corebox bottom on the roller conveyor.

Do you have some tricks of the foundry trade tucked away with your years of experience? Why not release them for use by fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your description

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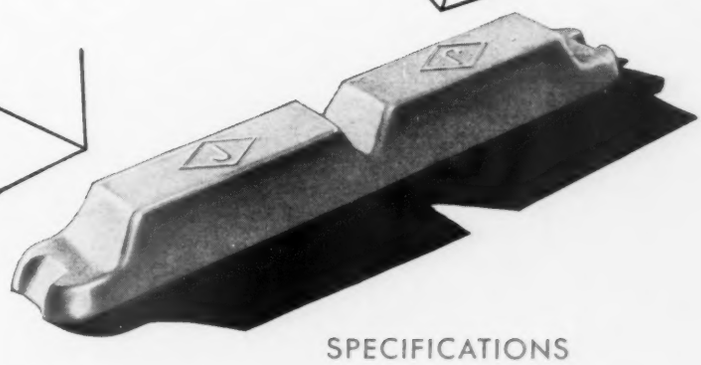

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Your Quality Control Program— Is It Effective?

By KENNETH MacKAY SMITH*

MANY foundrymen think of quality control as the process of producing a high-quality casting and duplicating that performance forever after. Not as many know how to go about installing an effective quality control program. As an industry, we have attained far more order in our production methods than we have in methods for acquiring quality. Within the last few years, however, technical developments have made it possible to organize quality control.

Before a program can be inaugurated, authority must be redelegated to make the program effective. This creates a problem in human relations. Departmental supervisors must be relieved of the actual responsibility for quality; yet their co-operation in the program is vital to its success. It is our belief that a high degree of co-operation can be expected only when all those who participate fully understand and appreciate the program and the part they play in it.

Supervisors have long been leaders in promoting and accepting ideas as logical as quality control. This is the development, the why and the how of Quality Control; and the emphasis is on co-operation. This article is written for top management and supervision, and describes the overall functions of quality control rather than the detailed technical devices necessary in the program's operation.

A short review of foundry history will help us understand recent developments which have given impetus to the final stage in the transition of an art to a science. The most important progress in testing and controlling properties of sands, metals and other foundry materials has been made in the last 25 years. Before that time, pioneers were investigating the secrets of sand and metal properties and the basis for control was being established.

Long before sand properties were understood, metallurgy and controls over the melting process had been making rapid strides. Without going into the details of this progress, it is important to remember that the control of metal properties was fairly well established while the control of sands and other materials was in its infancy. Quality control did not become possible until the properties of both metals and sands were understood and instruments developed to test and measure these properties. As foundrymen, we are deeply indebted to those outstanding men who have carried on the research and have produced the instruments.

During the 25-year period, plant metallurgists and commerical laboratories were employed and held responsible for controlling metal properties. Early in the period, the first versions of instruments for measuring sand properties of moisture, permeability and strength were being purchased by more and more foundries. Young, inexperienced men were often assigned to make routine tests, while decisions for changes in sand mixtures were usually made by foremen or superintendents. Meanwhile, considerable progress has been made in sand control. The first instruments have been improved; research has disclosed many new properties of sand; and instruments to measure them have been developed. Sand control has become an important science. Present-day decisions in sand control are usually made by men who understand the subject.

It is mainly in the last five years that leading foundrymen have been able to say, "We now have laboratory control over the properties of metals, sands and other foundry materials. We want a unified quality control program." This request is the logical conclusion of technical advancement. Quality control is the inevitable result of years of effort to produce castings with guaranteed properties.

It would seem that the next step would be to discuss the organization of quality control. However, during the period of technical advancement, certain other changes were occurring in the industry; and these changes merit prior consideration because of their effect on one phase of the program.

This was a period of great industrial growth in the United States. Technical advancement was matched by production techniques; and the two together have made the United States the world leader in productivity. In the foundry, mechanization, incentives, and know-how have all played their part in productivity. The changes that made this possible are many. We are mainly interested in those changes that have had an influence on a quality control program.

Mechanization, incentives and growth of organized labor all had an effect upon quality; and responsibility changed hands to keep pace with the new advancements. Formerly, skilled labor was largely held responsible for casting quality. As these new factors began to exert themselves, the departmental foreman was forced to assume more and more responsibility for quality. The incentive system, in particular, helped bring this about, because there were many disagreements between workers and supervisors regarding the responsibility for defective castings. Gradally the worker became less and less responsible for conditions affecting quality. Engineers began to

(*Continued on page* 190)

The author, associated with machine tool foundries the last 26 years, has just completed nine months' work in Italy with the Technical Assistance Division of the Mutual Security Agency. Previously he was assistant to the president, Hansell-Elcock Co., Chicago.

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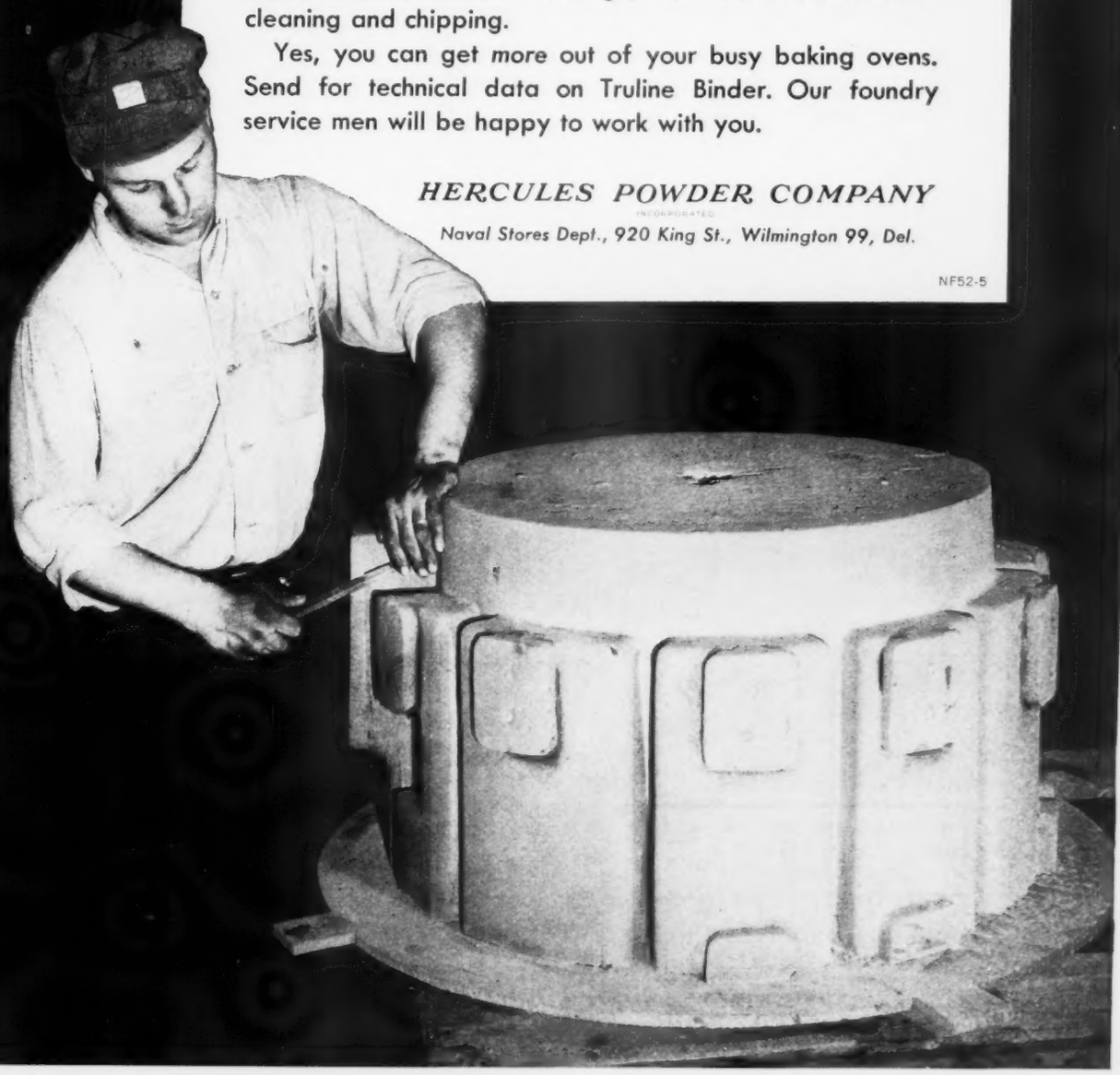

(*Continued from page* 188)

demand higher quality castings, forcing more rigid inspection requirements.

Incentives and mechanization also increased the foreman's responsibility for production; and the growth of organized labor presented new problems in carrying out his supervisory duties. Most of the time, he was in the middle of a tug of war between management and labor. The foreman's burden was becoming too great and something had to give. The foreman was better qualified to meet the demand for more production than he was for higher quality or quality control. In some plants, supervision was responsible for remarkable gains in production at lower unit cost; but its record was partly blemished by a higher percentage of defective castings. The time has come to separate the responsibility for quality from the responsibility for production.

A management that analyzes the value of the departmental supervisor must realize that he performs two functions which contribute greatly to the success of any organization. One is to supervise men in such a manner that he represents all of management's policies toward labor; the other, to devise and utilize means for increasing production. To perform these two functions well is a full-time job. Later we will show that quality control also is a full-time job. When the departmental supervisor has been relieved of the direct responsibility for quality, it is possible to fit quality control into any organization like a piece of a jigsaw puzzle. Remarkable accomplishments have occurred when production and quality have been treated separately, and the responsibility for each assigned to men especially trained for that job.

Now we come to the heart of the problem. It is with extreme reluctance that foremen, and sometimes even management, have accepted this new concept. The writer has spent the last eight months with a technical assistance program in a European country. The difficulty of organizing a quality control program in that country was even more pronounced than in the United States because of the reluctance of supervision to give active support. The foremen there have not yet been faced with heavy demands for increased production. Traditional lines of authority are deeply grooved and are not easily changed. The findings of the laboratory are difficult to put into practice because of conflicting authority.

Doorway Is Closed

It is as though the doorway between the laboratory and the foundry is closed to each other. Foundry foremen are sensitive about their position of authority over quality and jealously guard this position. Here in the United States, foremen have proved to be more flexible, and the problem is mostly one of misunderstanding. In modern foundry practice, quality can be controlled only through the laboratory, and the authority must be vested there. Co-operation is the key that opens the laboratory door.

We have said that one of the aims of this article is to explain quality control to supervision in order to get its whole-hearted support in carrying out the program. The value of this support cannot be overemphasized. A casting, like a chain, needs but one weak link to spoil it. Few of the products of industry depend so much upon the co-operation of the men who produce it. The departmental supervisor is a key figure in the matter of co-operation. His own attitude is reflected in that of the men who work under him. The credit for a successful quality control pro-

(*Continued on page* 192)

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(*Continued from page* 190)

gram is divided between those responsible for the program and the foremen whose co-operation make it possible.

The extent of a quality control program depends in part upon the size and type of the foundry. Any or all of the following functions can be included; and undoubtedly others could be incorporated.

1. Metal analysis and specifications.
2. Melting practice.
3. Pouring temperature control.
4. Control of sand properties.
5. Specifications for all foundry materials.
6. Baking temperatures and cycles of all foundry ovens.
7. Gating and risering techniques.
8. Mold hardness.
9. Determination of type and degree of rodding, securing and venting of molds and cores.
10. Finishing and securing external surfaces of molds and cores.
11. Setting up inspection requirements for cores, molds and castings.
12. Analysis of casting defects.
13. Responsibility for percentage of casting defects in foundry and machine shop.
14. Responsibility for cost of salvage.
15. Collaboration on casting and pattern design.
16. Responsibility for developing laboratory and foundry tests and experiments.

Hitherto the functions of quality control have been the part-time responsibility of all supervisors. Under an effective quality control program, these functions become the sole responsibility of one man. From the very nature of the functions themselves, it can be seen that this man must have special training. In addition to an understanding of metallurgy, melting practice and adequate laboratory experience in sand control, he should have had at least the equivalent of an apprenticeship in foundry practice. Considerable study and experience in analyzing casting defects is also necessary. It is essential that he keep up to date on latest developments in the quality control field. Since during the performance of his duties, the quality control chief comes into contact with supervisors, skilled and unskilled labor, tact and diplomacy are necessary personal qualifications as is a willingness to co-operate.

Engineers Have Advantage

When filling the position of chief of quality control, it may be dificult to find a man fully qualified in all requirements. Since laboratory experience in metals and sands is fundamental, graduate foundry engineers have some advantage. Before being given the responsibility for a quality control program, these men need practical experience in all of the functions outlined. Many men in the foundry industry who have not had the benefit of formal college training have trained themselves in metallurgy and have had foundry sand laboratory experience as well as years of overall foundry experience. Some of these men are in the ranks of departmental supervisors and may be interested in the position of chief of quality control.

We should turn next to the question of the amount of authority to be vested in the position of chief of quality control. The minimum amount of authority necessary to perform the job is greater than that of any departmental supervisor. The chief of quality control is the technical director and does not have authority for other management functions. Depending upon the size of the organization, he may be responsible to the foundry superintendent, foundry manager or even to a vice president in charge of quality control. The personnel of

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certain foundry operations directly connected with casting quality are sometimes made responsible to the quality control department. Good examples of functions wherein the personnel can be entirely responsible to quality control are:

1. Cupola and furnace operation.
2. Pouring temperature control.
3. Laboratory work.
4. Muller operation.
5. All inspections.

Whenever possible, it is advisable to include the personnel of the above operations under the jurisdiction of the quality control department. These functions are not production operations like molding, coremaking and cleaning. Man-hour and production requirements for these can be maintained by the chief of quality control.

Regarding the relationship between the quality control department and all foundry production departments, the control work must be carried on without sacrifice to high production requirements. In fact, it is a responsibility of quality control to help the supervisor increase production. This is accomplished by such means as developing molding and core sands with high flowability and by shortening operations through higher quality materials and mixtures.

If we have accomplished one of the major aims of this article, foremen who have been reluctant to accept their important role in the quality control program will be anxious to give their support. The opportunity to be an important cog in the wheel of progress more than compensates for relinquishing some authority over an outmoded and less efficient system of controlling quality. Remember, the quality control program cannot really be effective without you.

Co-operation Is Needed

Here are some of the ways you can co-operate: Give the quality control department the benefit of your ideas and experience. Be enthusiastic about the program and keep your men informed of its progress. When they are needed for experiments, follow details exactly. Better still, turn the necessary men temporarily over to the quality control department with orders to co-operate fully in accepting detailed instructions from that department. When it is necessary to run an experiment on molds or cores in the production line, your leadership at this time can do much to prevent confusion. Since time is often an important factor, remember your own experiences when this was true and do all within your power to provide men and facilities for the quality control department.

When experiments fail or need refinement, your attitude toward the experiments has an effect upon your workers. Be confident of final results or offer suggestions. See that your men follow controls set up under the program and that they keep accurate records. Keep the quality control department informed, at all times, of changes affecting quality. Increase your own value to the company by co-operating with the department and by taking advantage of your additional time and opportunity to increase production and to lower costs.

Work Accident Manual

Just off the press, the 1952 edition of "Accident Facts" points out that work injuries cost $2,650,000,000 and 280,000,000 man-days of lost labor in 1951. This statistical annual consists of 96 pages, 21 of which are devoted exclusively to occupational accidents and provide the factual background necessary to give direction to an industrial safety program. The book may be purchased for 75 cents from its publisher, the National Safety Council, 425 N. Michigan Ave., Chicago, 11.

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WHEN Your Respirator Filter Is Dirty, Get A New One!" Signs like this made up a "respirator maintenance program" at the Wheeling, W. Va., Works of Continental Foundry & Machine Co. until Sept. 30, 1946. Respirators of various types were provided by the company, printed bulletins told employees how to use and care for them, and the responsibility of following through was placed on the men.

It didn't work. Workmen used respirators until they could no longer breathe through them, then draped them around their necks like necklaces, or didn't wear them at all.

Realizing this was not in keeping with Continental's safety policies, the safety department went to work and came up with an idea which has resulted in complete acceptance of respiratory protection by the men. The program was planned around facilities available at the Wheeling plant. It works there, the safety department points out, because it was designed only for this plant. Before initiating the program, various types of respirators were studied, physical layout of the plant was considered, workmen were quizzed for their ideas, and information bulletins were issued to outline the new program.

The first step taken was to select an approved respirator which would be acceptable to employees. The Dustfoe respirator developed by Mine Safety Appliances Co., Pittsburgh, was chosen as the one most nearly answering the predetermined requirements. The safety department standardized on this respirator.

The company then established a cleaning and sterilizing program. Consideration was given to selecting a conveniently located "respirator headquarters." The room selected is along the route from the locker room to the foundry, a spot the men must pass on their way to and from work.

Finally, a distributing system was set up to make each man's respirator as personal as his own toothbrush.

All men who work in areas where protection is needed are issued respirators which have numbers cut into the aluminum facepieces. When the respirator is issued, the respirator number and the name of the man who receives it are recorded, along with the man's clock number. This is to prevent confusion if the man moves to another job where he will not need a respirator. These records are kept in the respirator department so the man who runs the department can locate the workman's respirator either

(*Concluded on page* 196)

Fig. 1—Respirator drying and storing rack. Rack positions and respirators are numbered

Fig. 2—Worker picks up his personal respirator before starting to work. New filter is inserted in the cleaned and sterilized respirator each day

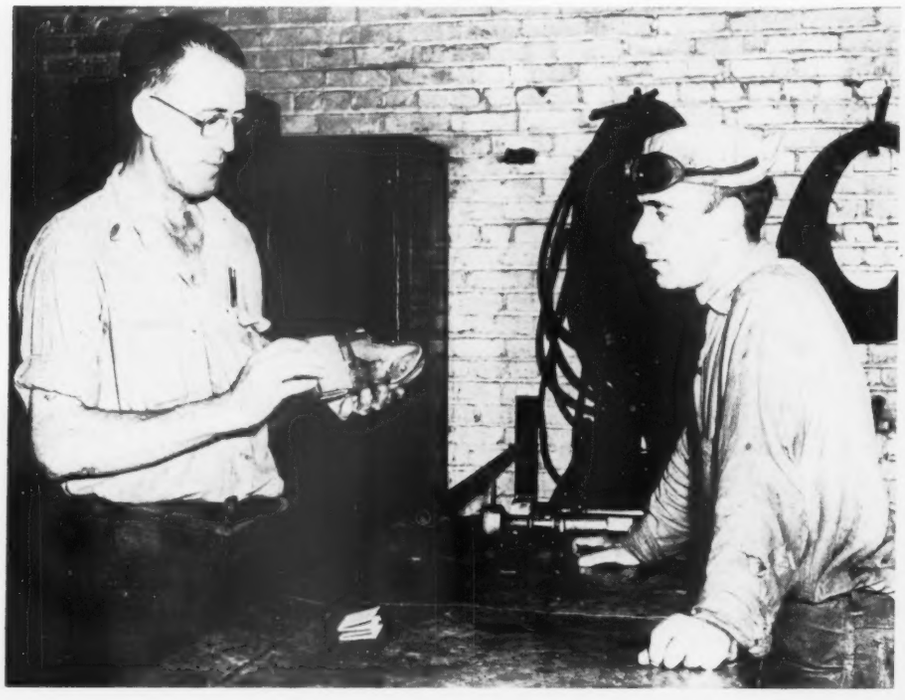


Fig. 3—Operator wearing respirator while chipping large ladle

When your eye is on Pittsburgh—and three dozen towns in its orbit—you're spotting scores of furnace operations regularly checked by Cities Service Heat Provers. Here, where they know all kinds of furnace instruments, and where high efficiency is most urgent today, the application of Heat Provers by Cities Service is increasingly valued.

It takes the Heat Prover to read simultaneously for oxygen and combustibles, measured direct by actual gas analysis. And the Heat Prover's continuous rapid sampling reveals effects of furnace adjustments at once. The Heat Prover frees you of maintenance too, because it's *not an instrument you buy, but a Service we supply.* Learn how it can raise productivity for you . . . in iron, steel, ceramics, glass, cement or any other furnace operation. Write CITIES SERVICE OIL COMPANY, Dept. J41, Sixty Wall Tower, New York City 5.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

(*Concluded from page* 194)

by name or respirator or clock number.

Putting all these things together gave Continental's safety department a workable respirator program. It started officially on Sept. 30, 1946. At that time 31 respirators were issued. Within two weeks this number had increased to 72. Today more than 200 respirators are in everyday use at the Wheeling Works.

Continental's safety department feels that the program is successful because of the manner in which it is handled. The worker knows the respirator he picks up each morning has been cleaned, sterilized, inspected, and equipped with a new filter. He also knows it is his own.

At the end of his shift, the Continental employee stops momentarily on his way from the job to the locker room and leaves his respirator at the cleaning department. Then that department takes over. The attendant in the cleaning room first removes and discards the filter from the respirator. When he has collected all the respirators from the shift going off, he places them in a wire basket and lowers the basket into a cleaning solution. He agitates the basket in the solution for five minutes to make sure the cleaner gets to all parts of the respirators.

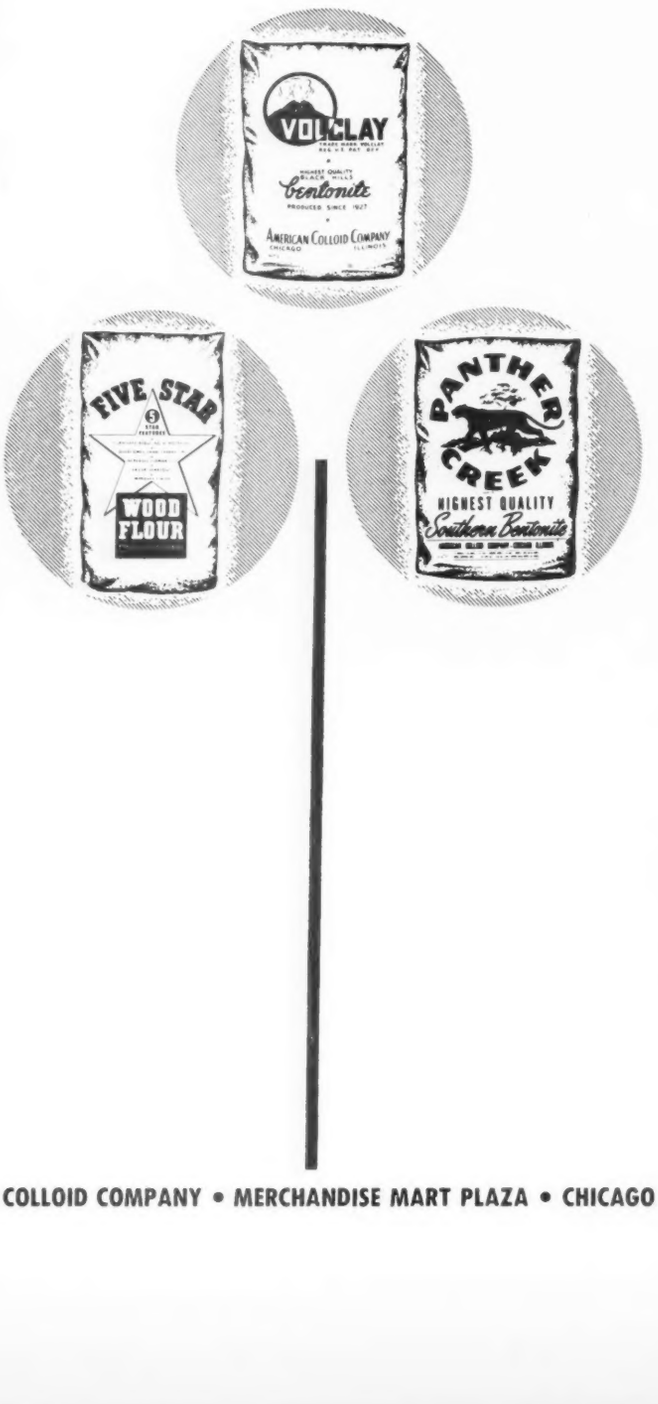
After the five-minute cleaning period, the respirators are removed from the solution and placed in a cold water rinse where they are manually agitated for five minutes before being placed in the sterilizing solution.

The respirators are rinsed in clear water for another five minutes following the sterilizing bath, then carefully examined for defects. Repairs and replacements can be made immediately since the respirator department keeps a complete stock of replacement parts and new respirators.

A special "lazy susan" type rack was built for drying and storing the respirators. Each holder in the rack is numbered to match the numbers of the respirator dried and stored there. Almost 16 hours elapse from the time they are cleaned and sterilized until the workmen pick them up again. This allows more than enough time for complete drying.

When the employee calls for his respirator before going on the job, the chief of the respirator department puts a brand new filter in it as he hands it to him. This filter is thrown away after he hands in the respirator at the end of his shift, and the cleaning, sterilizing, and repairing cycle begins again.

The entire maintenance program, exclusive of filter replacement, costs Continental only about 70 cents per day. But whatever the cost, the important consideration—and the only consideration as far as the company is concerned—is that every man who needs protection willingly wears a respirator.



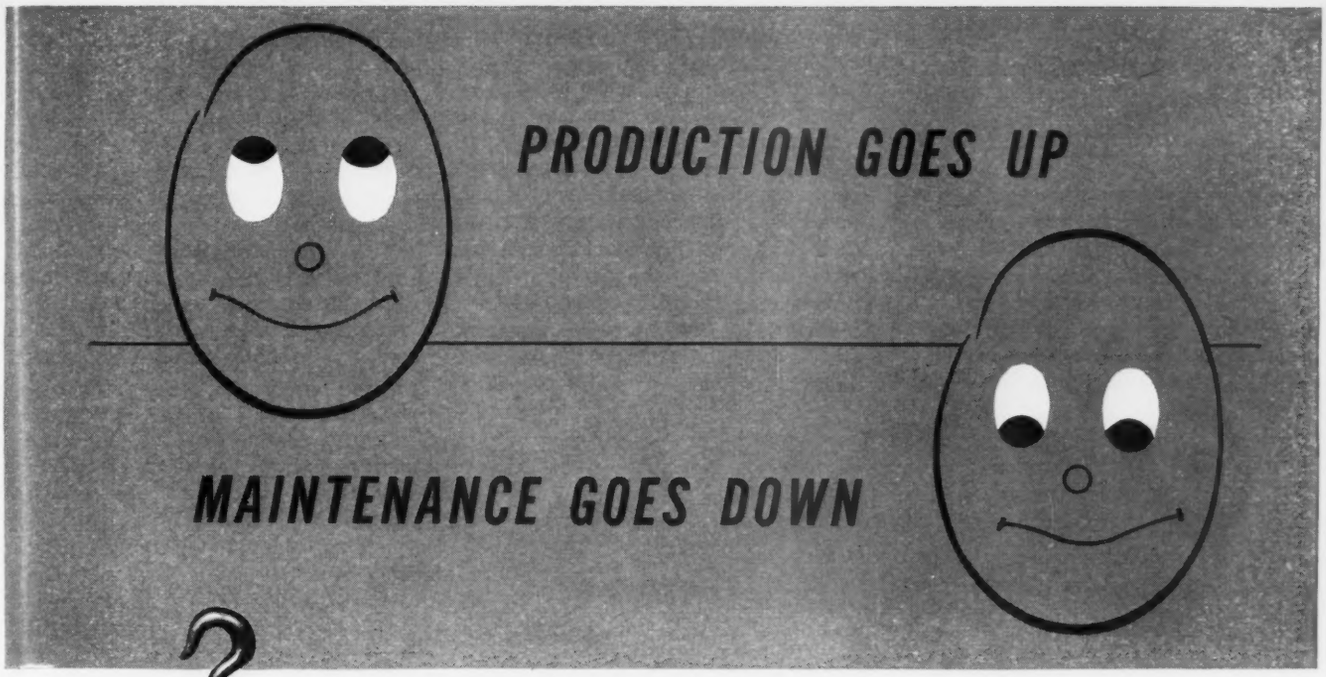
AMERICAN COLLOID COMPANY • MERCHANDISE MART PLAZA • CHICAGO 54, ILL.

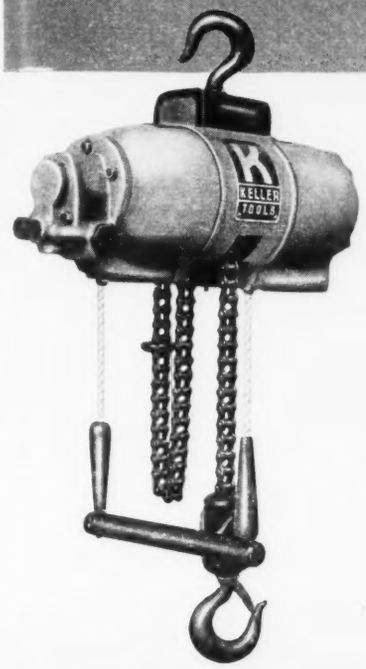
Schneible Film Depicts Dust, Fume Control

A new sound-color motion picture has been produced for the Claude B. Schneible Co., Box 81, North End Station, Detroit 2, Mich. Entitled "The Invisible Shield," it explains the operating principles of various types of equipment employed to control dust and fumes in the modern foundry.

Actual installation scenes of control units are unusually well photographed, and provide a good picture of many of the important foundry operations.

The 22-minute, 16 mm film is educational rather than commercial in nature, and is available through the Schneible company for showing before interested groups.





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Because Keller Hoists stand up to the rough, tough service that foundries demand. Maintenance is required but rarely. When it is needed, one man can easily climb a ladder and replace the hoist with a spare . . . with lost time counted in minutes instead of hours.

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300- and 1,000-lb Hoists weigh only 30 lb; 1-ton model only 75 lb. Simple design and few moving parts make maintenance easy and inexpensive.

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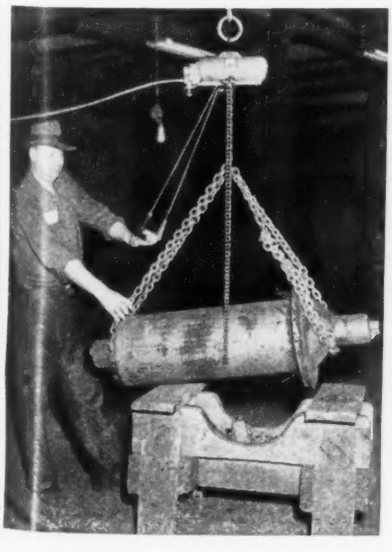
CAN'T BURN OUT
from stalling, even if stalled all day! Nor is the air motor injured by dust or fumes. Keller Hoists stand up to the severest tests in foundry use.



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Offers Complete Service On Shell Molding

By ERLE F. ROSS
Chicago Editor
FOUNDRY

ABOUT two months ago, Powdered Metal Products Corp. of America, Franklin Park, Ill., announced that, following experimental and development work carried out for more than a year, it had facilities for producing precision castings by shell molding techniques and was supplying such castings on a contract basis.

Now it has been announced further that its equipment and procedures are to be made available to industry on outright sale or rental basis. In rendering complete service, the company will service the machine, instruct operators and, where required, build dies and furnish the necessary sand-resin mix.

Powdered Metal Products was established in 1944 to make precision metal parts by powder metallurgy techniques. Several reasons prompted it to become interested in making precision parts by the casting process as well. Both processes require precision dies or patterns and extensive toolmaking facilities of similar character. The company had the necessary toolmaking facilities and the skilled know-how. Also, the company discovered that users of precision powder metal parts also are buyers of precision cast metal parts. Thus, both types of products could be offered without modification of sales representation or customer clientele.

Main purpose of the development work which Powdered Metal Products undertook was to find practical, economical production processes and equipment for applying the shell molding technique. After numerous pilot runs employing various methods, G. L. Bachner, company president, designed and built a completely automatic machine capable of turning out approximately 20 complete shells per hour from a single set of dies. The machine can be operated on a semiautomatic basis when desired.

The machine performs all steps of the shell molding operation, delivering finished shells for pouring or storage. Occupying a floor area about 6 x 12 ft and standing 11 ft high, it requires no special foundation. Approximately 150 sq ft of floor space will accommodate a complete shell molding setup, exclusive of pouring. Power is 220-volt ac with a compressed air supply.

Maximum pattern size which the machine will accommodate is 12 x 18 in., although larger can be provided for if necessary. With present bed size, patterns 12 x 12, 6 x 12 or 6 x 6-in. can be used, either singly or in multiple. Usual practice is to design patterns so that cope and drag shells are made simultaneously. In

Oven with infrared heating units is moving over shell to cure it. A bar on front of oven strikes off excess sand

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The Bellows Co.
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The Bellows Model BEM Air Motor is a complete straight line power unit in itself. There are no extra valves to buy. The electrically-controlled Bellows Electroaire 4-way directional valve is an integral part of the cylinder. Bullet fast, shock free. The solenoid control units are unconditionally guaranteed against burnout. Low voltage assures safety to operator and machines. Works perfectly flooded with coolant or piled with grinder dust or chips. Built-in speed control valves provide full regulation of piston rod speed in either or both directions. No expensive piping to install. Unique construction requires only one air connection which can be made with flexible hose.
The Bellows Air Motor is made in 1¼", 1¾", 2½", 3⅝" and 4½" bores. Any stroke length.
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AIR MOTORS
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other words, a single shell when broken in half makes one mold or when quartered makes two molds.

The bed of the machine on which the pattern is mounted is the bottom of a frame which rotates through 180 degrees. Mounted above the bed and capable of being lowered and raised is a sand hopper 12 in. square and 36 in. tall containing 2 cu ft of sand. Immediately back of bed and pattern is a half cylinder infrared furnace which rolls forward over the pattern for curing a shell and retracts when curing is complete. Ejector pins in the pattern eject the shell for the operator to remove.

Patterns are heated to approximately 450° F by cartridge-type resistance heating elements inserted in

Left, a precision casting made in a shell mold. Right, a shell mold section, showing half of the mold cavity

the pattern shoe and are maintained at the specified temperature automatically. Likewise, the infrared baking furnace is automatically controlled.

Shells are now assembled into molds ready for pouring or are stored until needed. The company has housed its melting operations separately. Melting equipment consists of a 400-lb rocking type electric furnace for steel, stainless steel and special alloys; and 400-lb and 150-lb gas-fired tilting crucible furnaces for nonferrous metals. For gray iron, the molds are transported across the street to the plant of the Major Foundry Co., an arrangement which will be continued.

For pouring smaller molds, the 6 x 6-in. ones, for example, some 30 molds are clamped tightly in a light steel rack which two men carry to furnace spouts for direct pouring. Larger molds are clamped in structural steel frames mounted on rollers or placed on a section of conveyor for direct pouring.

In its molding practice, the company uses special silica sand of 120 mesh, adding about 5 per cent resin binder and a wetting agent. It blends its own resins.

Annual Management Clinic To Be Held at Chicago

"Broadening the Field of Industrial Engineering" is the theme of the 16th annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society to be held Nov. 5-6-7 at the Sheraton Hotel, Chicago.

More than 2000 executives and methods engineers are expected to hear 28 industrial leaders scheduled to speak during the three-day event. Outstanding topics are "The Industrial Engineer's Role in Reducing Cost of Distribution," "The Application of Industrial Engineering to Retail Selling," and "Moral Re-armament," a discussion of the need for spiritual reawakening in business.

New clinic feature this year will be special group instruction on "How To Take Industrial Motion Pictures." Highlight of the program is expected to be the special achievement awards to companies and student groups whose methods improvements have been chosen winners in the Society's

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annual competition.

An educational talk, "Jet Planes... Guided Missiles—What Next?", will feature the closing banquet on Friday. Arthur Matthews, design engineer at McDonnell Aircraft Corp., will tell about some of the startling things in store for tomorrow in air power.

Among outstanding speakers who will address the clinic are Irl C. Martin, president, Woodward Governor Co., and Col. John Slezak, president, Turner Brass Works, Sycamore, Ill.

Large Electric Furnace Ordered in Britain

By ordering the largest electric arc melting furnace in Europe, the Stockbridge, England firm of Samuel Fox & Co. Ltd. has taken the first step towards what may be a new trend in European production methods for special steel.

The order was obtained by the Birmingham firm of Birlec Ltd., an associate of the Pittsburgh Lectromelt Furnace Corp. W. B. Wallis, president of Lectromelt, flew to Stockbridge to complete the contract negotiations for the furnace.

The new British furnace will have an annual output of roughly 75,000 tons of alloy steel and will produce at each melting, double the tonnage now obtained from the largest electric arc furnaces in England. It is to be powered by a high tension transformer of 15,000 kw, which in turn will be fitted with an "on-load" tap-changer to cut down on the melting time.

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Book Review

Metallurgy for Engineers, by John Wulff, Howard F. Taylor and Amos J. Shaler, cloth, 624 pages, 5¾ x 8¾ in., published by John Wiley & Sons, New York. Price, $6.75.

Three professors in metallurgy at Massachusetts Institute of Technology, with various experiences in the metals field, have prepared a text which will permit engineering students to gain an accurate understanding of the various metallurgical processes. The work also should be of interest and value to young foundrymen who have not had the benefit of special courses on the metallurgical phases of the casting process.

Because foundry practice and the problems of castings production receive quite adequate and most intelligent treatment in the new volume, it should be an important help to the industry. Where this book is used as a text, engineers who do not enter the foundry industry but serve in other fields so important to the successful application of cast parts to engineering construction, will understand castings, their production, advantages, shortcomings and fields of use.

The text represents experience during the past five years in teaching metallurgy to engineers at MIT. The material included is a required part of the curriculum at MIT for students in mechanical, aeronautical, marine engineering and in business administration. The first part of the book is concerned with principles, the last with processing practice.

Chapters of special interest to casting practice include the following: Introduction to sand casting processes; casting processes other than sand casting; melting, heat flow and gases in metals; castings defects, inspection methods and casting design; and gating and risering.

Illustrations for the text, prepared by George E. Schmidt Jr., are excellent and add much to the clearness with which the subject matter is presented.

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of Ferro-Alloys and Metals

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VANADIUM'S new color-coding system gives faster handling, quicker identification

HERE'S HOW IT WORKS:

A different color is assigned to each major alloying element. The color identifying each major element and the name of the product appear on every label.

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MAJOR PRODUCTS ARE IDENTIFIED BY THE FOLLOWING COLORS:

PRODUCT	COLOR	PRODUCT	COLOR
Aluminum	Silver	Ferro Vanadium	Light Blue
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Ferro Silicon	Red	Noduloy	Green
Ferro Titanium	Orange		

Multiple-element products are identified by combinations of colors. High carbon products are further identified by black squares on top band of the label, and low carbon products are identified by white squares on the top band of the label.

These product-identifying colors are used on drum labels; on car cards for carload shipments; and on tags attached to products shipped in bags.

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MAKERS OF ALLOYS CHEMICALS AND METALS

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Patternmaking Today

(*Concluded from page* 103)

sand from the half of the mold which does not have the pattern impression.

Mass production methods have brought some techniques to the pattern shop that should have been adopted long ago. Welding of patterns, as shown in Fig. 2 for instance, is relatively new, yet it is found to be indispensable in making engineering changes which would otherwise require extensive machining and fitting or even the remaking of the pattern. Furthermore, welding has proved itself very effective in the repair of broken patterns that formerly would have been replaced. The welding equipment used in this foundry consists of a Westinghouse Heliarc unit which uses argon gas for the inert shield around the arc. The argon shield protects the molten aluminum of the weld long enough for it to solidify and thus yield a clean weld that is free of oxide. Aluminum plates up to ¾-in. can be welded.

Machining More Prevalent

Another new technique involves machining of patterns and has become more prevalent since the advent of production methods. Many surfaces that are normally not machined in the casting are in many cases machined to size on the pattern.

The personnel of the pattern shop is extremely important for the successful undertaking of today's patternmaking problems. The patternmaker today must be more than just a mechanic who can produce a pattern to make a casting according to the specifications of a drawing. In order to build patterns for high-speed molding units, he must consider every phase of the molding operation so that everything runs smoothly.

The key to many of the problems lies in the background knowledge of the patternmaker and his consequent ability to make wise decisions. For instance, a job that would normally have been made requiring the setting of five or six cores per mold has to be made in such a way that the cores can be jointed and blackened together and thus be set into the mold as one core. If this provision were not built into the job, the value of the high-speed molding unit would be lost to the foundry through lost time.

Similarly, patterns that would normally have been made with several loose pieces to draw out separately in the sand cannot be made that way for use on molding machines, but should be incorporated in a core which can be set in the mold. The time saved in the molding operation will in most cases more than pay for the time spent in making the core. Also, since all the more active patterns are metal, today's patternmaker must have a good working knowledge of the molding units in a mechanized foundry as well as of the core blowing equipment in the coreroom. He should have a working knowledge of welding to know its limitations. Likewise, he should know something of the extent to which patterns may be machined.

Of course, the pattern shop has always worked with the foundry, but with mass production and the consequent high cost of comparatively minor discords, it is now vitally important that foundry and patternshop be well integrated. The pattern shop must keep in mind constantly the capacities of core and molding machines as well as the relative cost of producing molds and cores on the respective machines. With this close co-operation and application of know-how, the foundries can continue to produce castings in large quantities at a competitive price to supply the assembly lines of the world.

Where space is limited, Bradley semi-circular Washfountains will meet requirements. Each serves 4 to 6 persons. Foot-control and self-rinsing bowl provide the utmost in sanitation and prevent water waste.

Illustrated Catalog 5204 sent promptly on request.

● The Bradleyman draws upon the experience gained by serving an ever-widening group of Bradley users for over 30 years. His practical suggestions for washroom layouts and use of Bradley group-washing fixtures can help you find the most economical way to provide adequate facilities in a minimum of space.

Bradley 54" Washfountains accommodate 8 to 10 persons simultaneously—replace 8 to 10 single-person basins. Piping connections are reduced 80% and one sprayhead replaces as many as 20 faucets. Maintenance and water consumption are reduced sharply. Foot-control stops contagious washbasin contacts and promotes a new high in employee health and safety. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wis.

BRADLEY *washfountains*

Sold Through Plumbing Wholesalers

Air Pollution Ordinances

(*Concluded from page* 107)

foundry cupola means an expenditure of $2 to $3 per cfm instead of 15 to 50 cents for their other operations. This difference for a single moderate size cupola can be $20,000 or more. Certainly in many localities the need for adding such a burden to the foundry is premature. Actually the publicity given to the need for such refined collection has stopped many an installation of control equipment that would have reduced the loadings discharged to the atmosphere to the degree reported in the accompanying table.

No businessman is going to install expensive equipment with the present lack of any assurance that it will be accepted a year or two after its installation. In addition, the same manager will find it hard to justify the marked increased cost for control equipment that will reduce the visible escapement and yet actually reduce the *weight* of effluent material by only the few pounds involved. Likewise the equipment manufacturer will be reluctant to make performance guarantees on a visible appearance basis with the complete lack of any scientific method of translation into weight or number of particles that will be acceptable.

The ease of enforcement of an air pollution program based on no visible escapement from industrial stacks can be recognized. The cost and delays involved in stack sampling to establish weight emissions necessary before violation of most control ordinances can be determined are also appreciated. Yet in most areas of our country, citizens are objecting most to the nuisance fraction of solids escaping our industrial stacks, and little effort has been made to tell them that visible effluents consisting of small particle sizes in low concentrations are not the source of the settled dust on laundry, porches, window sills, and autos.

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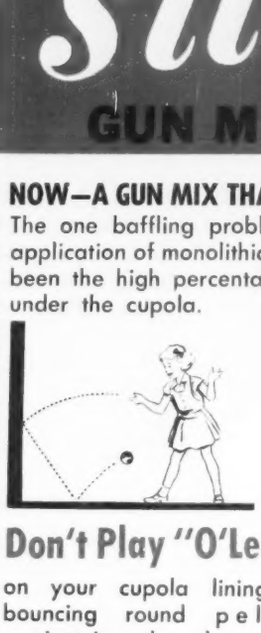
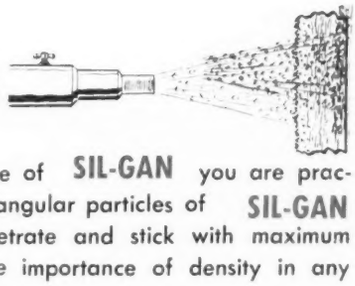


Don't Play "O'Leary"

on your cupola lining by bouncing round pellets against it with a large percentage falling to the floor.

This little girl is having fun. Her ball bounces easily because it is round.

PLAY DARTS INSTEAD



With the unique, long, finger-like cleavage of SIL-GAN you are practically "Playing Darts". When the sharp angular particles of SIL-GAN strike the wall of the cupola, they penetrate and stick with maximum density. Ceramic Engineers recognize the importance of density in any refractory material.

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Maintenance Conference Planned for January

Sixty-six separate sessions on maintenance problems have been scheduled for the Plant Maintenance Conference at Public Auditorium, Cleveland, Jan. 19-22. They will include 3 panels, 16 sectional conferences, 42 roundtables, 4 plant tours and a banquet.

Special discussions will be devoted to maintenance problems in the foundry, automotive, chemical, electrical, food, paper, petroleum, printing, rubber, steel and textile industries. Separate conferences also will be held for maintenance problems in small, medium and large plants, grouped according to the number of maintenance employees. Plant engineering problems will be discussed in similarly divided groups.

Advance registration cards and hotel information may be obtained from Clapp & Poliak Inc., 341 Madison Ave., New York 17.

Book Review

Die Praxis der Warmbehandlung des Stahles (Steel Heat Treatment Practice), by P. Klostermann, paper, 68 pages, 6 x 9 in., published by Springer-Verlag, Berlin, Germany. Price 3.60 DM.

One of a series of shop practice booklets in German, this discusses heat treatment of steel parts, and is divided into seven sections on different phases of the subject, including general methods and equipment, heating, cooling and quenching, annealing, carburizing, cleaning and straightening, and causes and remedies for defective work.

Developing Cast Products

(*Concluded from page* 123)

Modification of New Design—Design modification is not necessary if the proposed design is satisfactory. However, if the design does not meet service requirements, the results of the experimental stress analysis will indicate the action necessary to improve stress distribution. This is done by the addition or removal of metal adjacent to the highly stressed areas. Removal of the metal without disturbance to the strain gages is illustrated in Fig. 8. The part can be tested again to determine if the stress reduction is sufficient. Metal can be added to the casting by welding, as indicated in Fig. 9. When modifications in the design have been effected, the procedure from step five on should be repeated. Thus optimum designs may be developed which are based on facts instead of opinions.

Re-evaluation of New Design—Modifications are made and evaluated by experimental stress analysis until the design is acceptable. The foundry engineer then writes a report covering the development of the steel casting design and submits it to the customer for his approval.

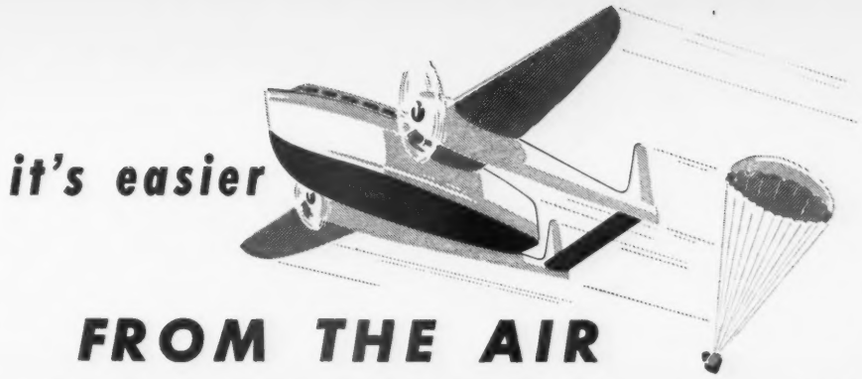
Conclusion—The customer release can be written in all confidence since the casting design has been engineered for the foundry and by the foundry on sound engineering principles. Everyone concerned thus has confidence in the new product.

"Foundry Engineered" products result in savings to both the customer and the foundry. Products developed by this method have resulted in savings to customers ranging from 15.9 to 38.4 per cent, customer relations have been improved, and confidence in the cast steel industry has been firmly established.

Marks 75th Anniversary

Hydraulic Press Mfg. Co. marked its 75th anniversary this summer. Producers of the first hydraulic press, the company has made numerous contributions to the hydraulic high-pressure processing of metals, plastics, ceramics, wood, reinforced plastics and other materials.

The company now has two plants in Mount Gilead, O., not far from Edison, where Augustus Q. Tucker developed the first hydraulic press to press cider from the apples he grew in his orchard there, then went on to found HPM in 1877. Plant No. 1 handles production of hydraulic power equipment exclusively, and Plant No. 2 is devoted entirely to the manufacture of presses.



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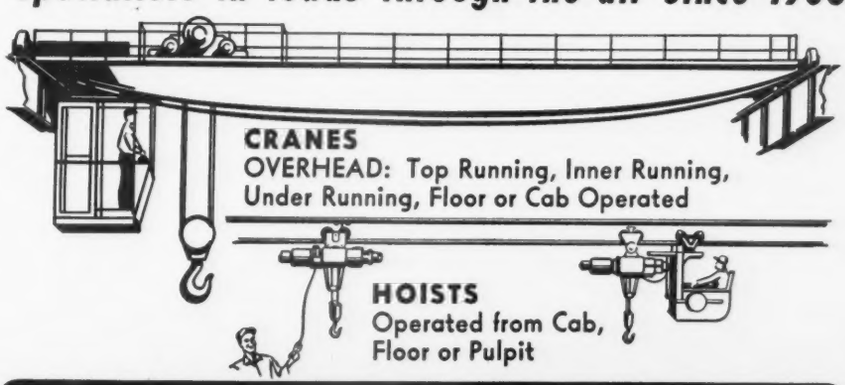
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Effect of Raw Materials on CUPOLA OPERATION

By BERNARD P. MULCAHY
President
Fuel Research Laboratory Inc.
Inidanapolis

Beehive coke and anthracite coal can be effectively used as auxiliary cupola fuels, but they require the special handling described in this sixth of a series of articles

BEEHIVE coke derives its name from the type of oven in which it is made. Just as oven coke takes its principal characteristics from the oven chamber, so beehive coke also is influenced by the conditions surrounding its production.

We are well aware that prior to the introduction of the slot coke oven, the beehive oven was the principal source of coke. As the chemical recovery ovens gained in application because of expanding steel demands, the beehive ovens were gradually shut down due to obsolescence. With steel demands increased by World War II, many of these older ovens were brought back into service again, and a large number still remain in operation.

This brief historical reference is necessary in connection with this discussion of beehive coke because its use by the foundry industry is closely allied to the entire coke industry.

Coke as a whole is more closely connected with the steel industry than with the gray iron foundry industry. Most coke production facilities are directly owned by the steel companies; merchant coke plants in many instances can get a higher gas yield and a greater output of blast furnace coke, and foundry coke offers a rather restricted market and is therefore not a desirable product to many coke plants.

In times of high steel demand the normal supply of foundry coke diminishes for the above reasons, and the foundry industry is forced to supplement its supply by the use of beehive coke. Of course, not all beehive coke is produced on this basis. Over the years, many foundries have used beehive coke either totally or in part with very good results.

Our concern, however, is with the use of beehive coke during periods of stress when the regular oven coke is in short supply and it becomes necessary for many foundries without previous experience in the use of beehive coke to use large quantities of it, frequently of somewhat poor quality.

There are, of course, several sources of beehive coke with excellent properties, both chemically and physically, but these are too few to supply the demand generated during a general coke shortage.

Beehive coke is produced in circular domed chambers, where a charge of coal approximately 24 in. deep is coked by the heat reflected downward for a period of 72 to 96 hr. This process produces long, spindly pieces of coke. Additionally, the coal is all high volatile and therefore subject to considerable contraction on coking; hence the brittleness commonly associated with this type of coke. Longer coking time, of course, lessens this brittleness.

We mentioned previously in our section on oven coke the importance of coke size; the principal difficulty associated with the use of beehive coke involves its native size and its tendency to break with handling. Chemically some beehive cokes are quite superior to some oven cokes in ash, sulphur and carbon characteristics.

Almost all foundries have experienced difficulty at times with small oven coke; yet this coke generally breaks into approximate cubes, and a little screening will immediately improve its size. Beehive coke, on the other hand, leafs and interlocks because of the native long, slender pieces, and when breakage produces a quantity of fines, a pile of this coke becomes so compacted that it has very little permeability.

The size and shape factor of this coke is emphasized as the fundamental source of difficulty in its use. In previous sections the influence of small coke on carbon absorption, melting rate, metal temperature and coke ratios has been mentioned. These difficulties are magnified with beehive coke for the same fundamental reason. The wind cannot penetrate and distribute itself throughout the column of coke in the bed, but for the most part passes through a narrow annular ring next to the cupola wall. This passage causes localized combustion and melting and establishes a zone or state of high oxidation.

When beehive coke is purchased of necessity, the quantity used is generally directly proportional to the amount purchased. For example, if 25 per cent of the total coke purchased is beehive, then approximately 25 per cent of the coke charge is also beehive, which is so distributed on each charge. This use is a serious mistake and accounts for the numerous bad reports concerning beehive coke.

If we but visualize the size and shape characteristics of each coke, we can immediately see that if we mix beehive coke with oven coke, the long slender coke easily mixes with the larger, blockier oven coke in a manner that will seriously reduce the void space available. This condition is aggravated if neither of the cokes is screened.

Let us consider two effective ways to use beehive coke. The first is to use 50 per cent oven coke and 50 per cent beehive coke.

In this instance it is assumed that there is sufficient oven coke to permit construction of the initial bed of this material.

We have repeatedly stressed the necessity of removing the fine coke (less than 2 to 3 in.) for any operation, and in this instance this screening is a must. If the cupola is 60 in. or larger, the bed coke should be screened over a 3-in. screen; cupolas of less than 60 in. can get by on 2½-in. screening.

With the bed coke prepared from oven coke over 3 in., the first coke charge will be beehive coke, also screened over a 3-in. screen, the succeeding charge will be oven coke and so on, each charge alternating the two cokes. *They must never be mixed.*

Charging the coke in this manner

(Continued on page 208)

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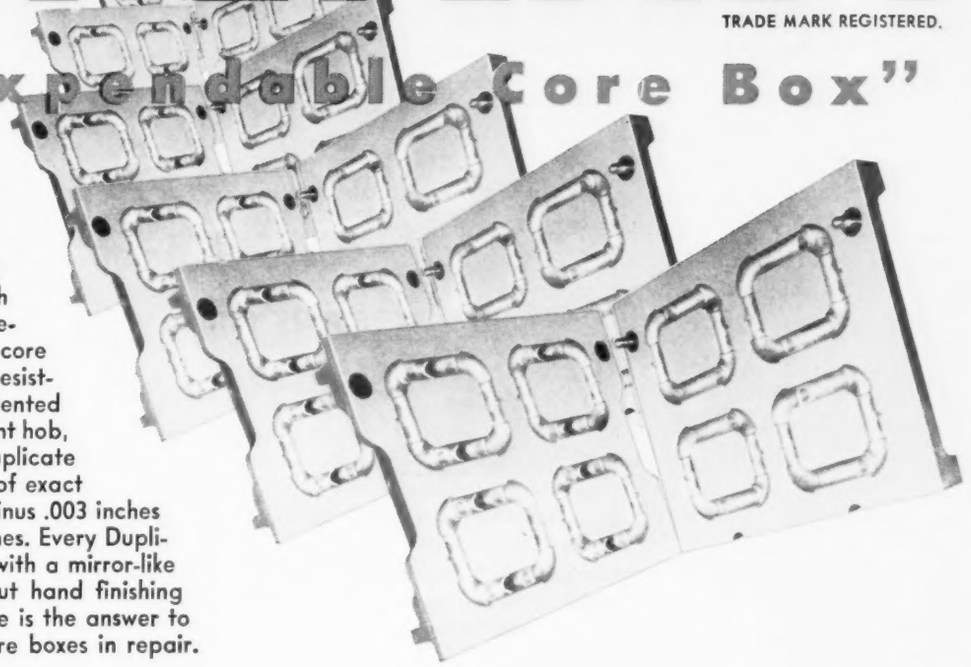

Duplicast is the ideal core box for high production schedules and for complicated irregular contoured shapes and cavities which otherwise are costly to replace or repair. Duplicast core boxes are made of a wear resistant aluminum alloy by a patented method in which a permanent hob, or mandrel, is used to duplicate any number of core boxes of exact dimensions within plus or minus .003 inches within a distance of 12 inches. Every Duplicast core box is produced with a mirror-like finish in the cavities without hand finishing or tooling of any kind. Here is the answer to the problem of keeping core boxes in repair.

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INDUSTRIAL PATTERN WORKS

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(*Continued from page* 206)

will always create sufficient voids throughout the bed for better penetration.

If this screening and alternate charging plan is followed, it will be found that no more total coke (including fines) is used than if the fines had been left in, and that metal temperatures, melting rates, and carbon absorption are considerably better without fines.

The second example of how to use beehive coke effectively is to use 100 per cent of it.

In this instance the bed coke should be screened over a 4-in. screen and the coke for succeeding charges over a 3-in. screen. The reason for this procedure is to create as optimum a bed condition as possible.

When using 100 per cent beehive coke (even screened), you may find it necessary to use a little more coke and reduce the blast. The brittleness of this coke will produce a high percentage of fines which will reduce penetration.

Obviously, reducing the blast will slow down the melting rate, but it is better to produce good iron at a reduced rate than poor iron at an increased rate. The additional coke will slow down the melting rate, but it will reduce oxidation and maintain the carbon level to a better degree.

It has been said many times about the use of beehive coke that carbons are always lower. This is possible because of the type of carbon present in some of these cokes. An examination will reveal on the outside of the piece a "knobby," slick surface of the coke which is pure graphite carbon deposited by the gases during the process.

In connection with oven coke it has been mentioned that a "green" coke burns considerably faster than a thoroughly carbonized coke—i.e., one with very little volatile matter remaining. In the beehive process the longer coking time tends to reduce the residual volatile matter to a greater extent, leaving, of course, almost pure carbon. As the process of coking continues, the escaping gases are decomposed by the incandescent coke surface, and pure carbon is deposited. Maintenance of high temperature converts this carbon to the graphite state.

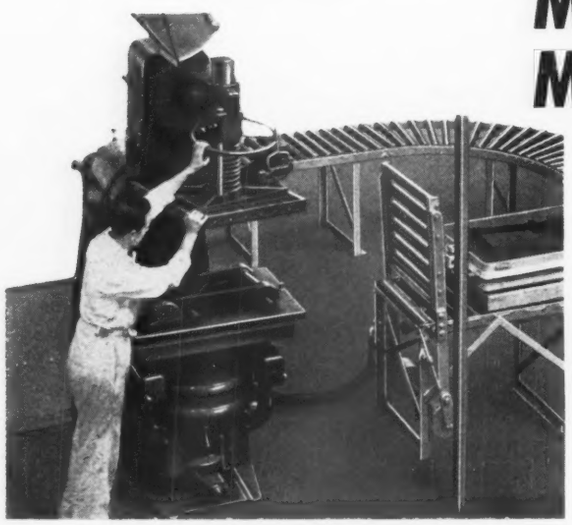
Although this graphite carbon is considerably harder to burn than a regular coke carbon, it can be burned if one uses a greater quantity of air. But this practice presents a problem because if the coke is brittle and produces fines, a higher air blast will cause oxidation. When this coke is screened over a 4-in. screen and used in slightly larger quantities, it can be used with excellent results, and all operating factors are optimum. Such use produces high carbon, high melting rates and high metal temperature.

Frequently high ash and high sulphur accompany the beehive coke. These factors should be treated in the same manner as oven coke.

In summary, it is emphasized that the size, shape and brittleness of beehive coke are the factors which cause the greatest difficulty in its use and that if screening and selective charging are practiced, the coke can be used with complete confidence and good results. In general the total amount used will be greater than that consumed in normal operation with oven coke, but this cost will be nominal compared with the reduced operations that will be required without it to extend the coke supply.

Anthracite Coal—On some past occasions as the total demand for coke increased, the supply of beehive coke also proved insufficient, and in certain sections of the country it was

NEW *High Speed* ROLLOVER MOLDING MACHINES



15 seconds from empty flask to finished mold

built by BRITISH MOULDING MACHINE COMPANY

. . . these new Type BT molding machines combine the convenience and accuracy of roll-over molding with speeds comparable to the fastest straight-draw or pin lift methods . . . plus a two-year guarantee.

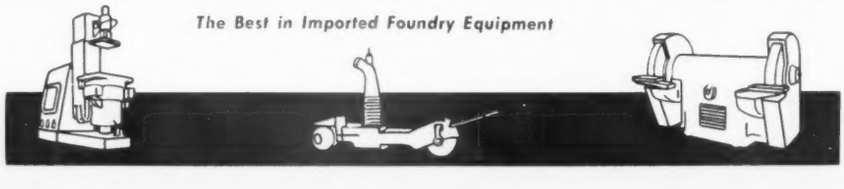
Push-button control speeds production, decreases operational fatigue. Accuracy of draw . . . within 2-thousandths of total length . . . permits production of deep and intricate molds . . . even with green sand cores. Patented pneumatic anvil rests solidly on baseplate during jolting, does away with wearing loads on bearings and other parts.

Easier to maintain, too. Built-in air filters, automatic lubrication, fully enclosed hydraulic rollover mechanism and many other time-tested construction features result in years of trouble-free service. A complete supply of packings and parts is maintained at our Stamford works.

Both the BT-1 (8" draw) and the larger BT-5, (12½" draw) are set up in our Stamford plant for production testing of your most difficult patterns. Write us today for further details.

STAMFORD ENGINEERING WORKS, 507 Canal St., STAMFORD, CONN.

The Best in Imported Foundry Equipment



additionally necessary to use some anthracite coal. In order to interpret properly the action of this fuel in the cupola, we should initially understand the fundamental difference between anthracite and coke.

Physically there is a big difference between the two fuels. Whereas coke is cellular or porous, anthracite is solid and compact. Coke has been built up into an almost continuous piece with fairly regular composition throughout. Anthracite consists of numerous layers resulting from the native deposition during its formation. Anthracite screens to a more or less cubical form, but coke, no matter how closely screened, presents many irregular surfaces.

The weight of anthracite per volume is about twice that of coke, and the permeability of a bed of anthracite is slightly less than that of coke (less per cent of voids). Both of these factors are quite important in the actual combustion in the bed.

Just as beehive coke was superseded by oven coke, so anthracite coal was replaced originally as a cupola fuel by beehive coke. One of the principal reasons for this replacement was the higher driving rates possible with coke.

Weight and Volume

Theoretically the difference between reaction rates of different forms of carbon is believed to become less influential at the existing bed temperatures encountered in a cupola, but this conclusion *per se* is very misleading because our concern is with the heat distribution throughout the bed and the potential state of change of gaseous composition above the bed.

Let us return for a moment to the difference in weight per volume of the two fuels. Since anthracite has twice the weight of coke, it is apparent that if we use the same quantity of fuel per unit weight of iron, we will have only half the volume of anthracite that we would with coke. Even if the reaction rates are the same, we must remember that the surface area for anthracite is less than half that of coke and that we would subject the iron to a dangerous oxidation condition because the oxygen in the blast would not be totally consumed.

In considering combustion in any fuel bed, we must think in terms of total conditions affecting the heat distribution, not of just one factor. We have already pointed out that the volume of anthracite per unit of weight is approximately one-half that of coke. Additionally, we mentioned that the native voids of anthracite were less than those of coke and that the carbon surface exposure is therefore less than half.

Although anthracite generally has good physical strength, it is subject to some thermal shock in its passage through the cupola. This degradation, however, is probably no more severe than the degradation of coke originating from the native fissures.

If we translate the above factors into their influence on the cupola when anthracite is substituted for part of the coke charge, the general experience has been as follows: Reduction in melting capacity, reduction in metal temperature and difficulty in maintaining carbons. These conditions do not all have to occur simultaneously, but the degree of each is influenced by the amount of anthracite used, the size (particle) of anthracite used, the coke with which the anthracite is used and the manner in which the anthracite is used.

The reduction in melting capacity is largely dependent on the permea-

(*Concluded on page* 211)

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HIGH SPEED GRINDERS

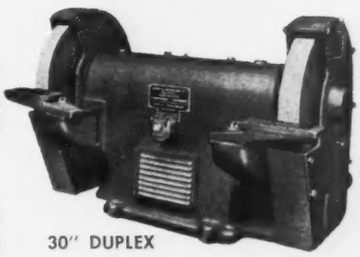
Economical • Rugged • Flexible

DUPLEX:

Independent 3-speed control to each wheel for maximum grinding efficiency. Maintains 9000 fpm. surface speed throughout the life of the wheel.

Wheels *cannot* be run at unsafe speeds. Wheel speed cannot be advanced until work rest is advanced to new speed range. New wheel cannot be installed without moving work rest . . . and speed control . . . to outer, slowest position.

High-quality construction includes massive cast iron body, with high-tensile steel spindles mounted on oversize sealed roller and ball bearings. Efficient vacuum dust system exhausts to outside. Front of body is swept back for foot clearance.



30" DUPLEX

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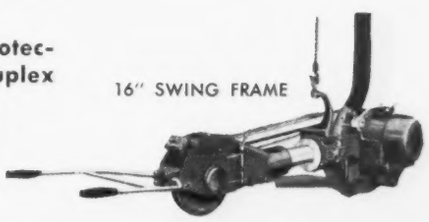
SWING FRAME:

Special integral exhaust system practically eliminates grinding dusts.

2-speed drive, with over-speed protection similar to that used for Duplex grinders, maintains wheel surface velocity near the desired 9000 fpm. at all times. Motor is 7½ hp. for plus power on heaviest grinding jobs.



16" SWING FRAME

All Luke & Spencer grinders are furnished with the new "Borolite" resinoid-bonded high speed abrasive wheels. Allowable speed is 9000 fpm. . . . nearly twice the speed of vitrified wheels. Grain structure is open, fast cutting. Economical in first cost, cutting time and long life. Write now for complete information.

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The Best in Imported Foundry Equipment

Fremont MAGNESIUM FLASKS

The Way to

MORE EXACTING WORK

Accurately machined inside surfaces and flanges. Steel faced top and bottom flanges.

LONGER SERVICE

Magnesium has twice the tensile strength of aluminum.

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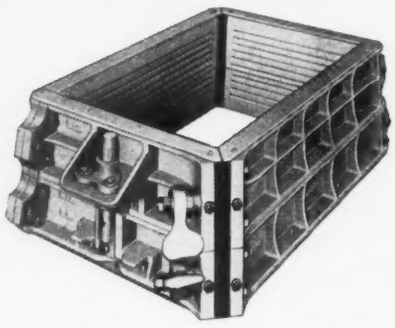
Magnesium weighs 1/3 less than aluminum.

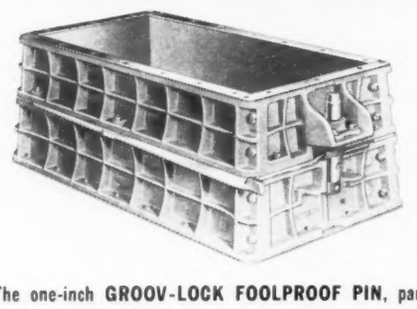
All orders given prompt attention. Write today for literature.

The New FREMONT SPREADLOCK FLASK



Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners.

FREMONT STANDARD SLIP FLASK



The one-inch **GROOV-LOCK FOOLPROOF PIN**, particularly adapted to cope or drag pattern jobs, guarantees perfect alignment indefinitely. (Other types of standard pin fittings available.) Solid, bolted and welded corner construction.

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

Save You Real Money!

Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries. Glass and jackets can be assembled on 3°, 4°, or 5° taper.

THE FREMONT FLASK CO.

FREMONT, OHIO

(*Concluded from page* 209)

bility of the bed (size of fuel) or the amount of fuel used. This is similar to the same effect with all coke. Reduction in metal temperature is also dependent on fuel size, but the slower reaction rate of anthracite may also affect this condition. Lower carbon absorption is also dependent on the above conditions.

You can do a number of things to achieve effective use of anthracite. If at all possible obtain a size at least equal to the average sized coke which has shown good results for the particular cupola. Learn, if possible, its behavior for cupola operation—i.e., does it have a size stability through the cupola to keep the bed open? Screen out all the fines of less than 3 in. before charging. Mix the anthracite intimately with the coke. If temperatures show a tendency to drop, increase the air rate gradually until the proper level has been found. If carbons are lower because of anthracite, increase the fuel bed and fuel charge and increase the wind rate.

The purpose of recommending that the anthracite be mixed intimately with the coke is to take advantage of the faster combustibility of the coke and its higher attained temperatures. In this manner the counter influence of the anthracite is reduced, and greater amounts can be used.

The above recommendations, it will be noted, follow the same general pattern of adjustment suggested for the different grades of poor coke, and this again emphasizes the fact that the fuel and the air are intimately related and that when the characteristics of the fuel are known, it is possible by means of air adjustments to produce satisfactory performance from the cupola, even with strange fuels.

Book Review

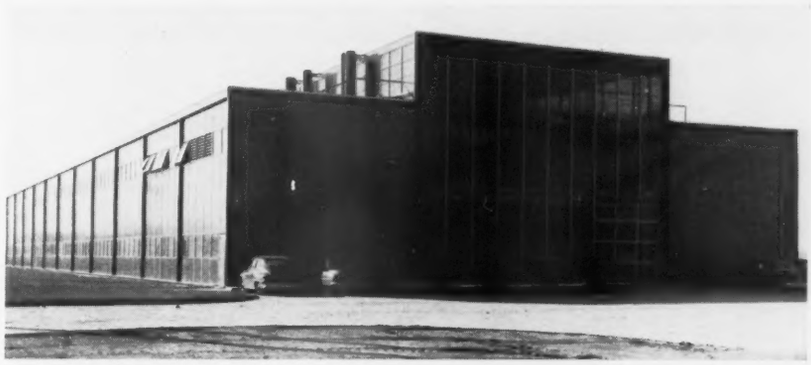
Metallkunde, Band II, Eigenschaften, Grundzuege der Form- und Zustandsgebung (Metallurgy—its characteristics, Basic Tools for Forming and Conditioning), by Heinz Borchers, paper, 154 pages, 4 x 6¼ in., published by Walter deGruyter & Co., Berlin, Germany. Price 2.40 DM.

Forming part II of a series of German booklets on metallurgy, this volume essentially is divided into two sections. The first relates to the characteristics or properties of some metals and other elements, and the other to forming or shaping and conditioning or treating. Latter section discusses electrolytic separation, spraying, sintering, melting and pouring, rolling, etc., heat treatment, surface treatment, etc.

75th Anniversary of Jeffrey Mfg. Co.

Approximately 10,000 visitors took tours through the offices and shops of the Jeffrey Mfg. Co., Columbus, O., when it commemorated its 75th anniversary on June 21 with an open house for employees, their families and guests. Each visitor received a gift and a 16-page, two-color anniversary booklet which contained a message of welcome, a brief history of the company, pictures of Jeffrey products and depictions of various employee social activities. Refreshments were amply provided. Many visitors had their first opportunity to see some of the mining and materials handling equipment which Jeffrey builds.

General Motors Opens Experimental Foundry

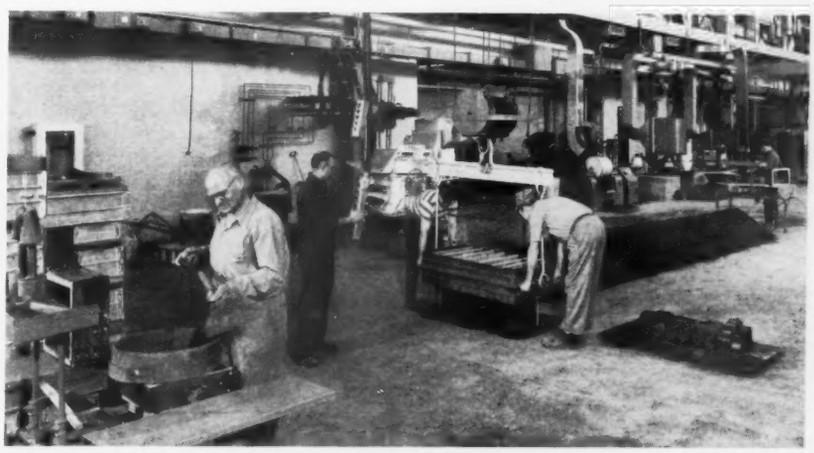


GENERAL Motors Corp., recently opened its new metallurgy building, first in a series of structures which will comprise the research laboratories group in the company's technical center north of Detroit at Twelve Mile and Mound roads. The experimental foundry is equipped with the most up-to-date laboratory and testing equipment available for metallurgical research, as well as pilot plant areas for experimental production operations in all common metals.

The new building, 320 ft long, 110 ft wide, and 36 ft high over the bay, is of light industrial type construction, with a monitor top 50 ft wide extending its entire length. Construction of the building permits maximum flexibility in the operation, placement and rearrangement of equipment, ducts, piping and conduits. Utilities can be distributed to any part of the foundry from convenient control locations or rearranged without costly building changes.

Laboratory and offices are ranged along a gallery on either side of the foundry bay. They and the foundry area are air-conditioned and have acoustically treated ceilings to minimize noise. Air in the entire structure can be changed within 3 or 4 minutes. All dust, dirt and fumes are removed at their source, thus eliminating contamination of the general area. Abundant natural and artificial lighting characterizes the building. A minimum of 50 foot candles is provided throughout.

Dr. Robert F. Thomson is head of the research metallurgy department.



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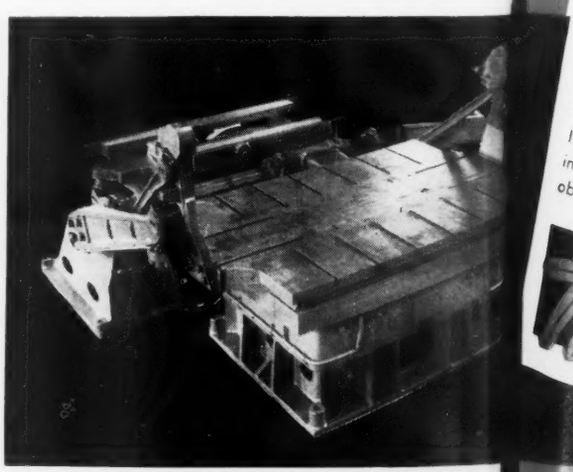
because "Herman Molding Machines have served the Birdsboro Steel Foundry & Machine Company dependably since 1922 in No. 2 Foundry. Two 10,000 pound Rollover Capacity Series Machines, one used in the manufacture of side frames and bolster drags and the other on copes for the railroad industry, can be depended upon to operate with a minimum of maintenance during the operating periods. We would also state uniformity of mold is very necessary and is obtained with Herman Pneumatic Molding Machines."

Mr. Wm. J. Johnson,
Superintendent of Foundries
Birdsboro Steel Foundry & Machine Co.

Herman Molding Machines are contributing to the efficient operation of foundries throughout the world, making them, like Birdsboro Steel Foundry & Machine Co., *good places to work*. The reason lies in the machines themselves . . . they are engineered with care and built to last; one rotary valve handle makes them simple to operate; timing and lubrication are automatic. Given the opportunity in your foundry, Herman Molding Machines can prove that *they have made their way by the way they're made*.



Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

GM MACHINES

t work →

The ad reproduced herewith originally appeared in the November, 1949 issue of FOUNDRY.

Birdsboro Steel Foundry & Machine Co.
Birdsboro, Pennsylvania

THIS FOUNDRY IS A GOOD PLACE TO WORK

This modern foundry, constructed of steel and glass, and employing 1300 people, is designed to produce a large variety of steel castings including railroad side frames and bolsters, marine castings, hydraulic press equipment, etc.

It is a highly mechanized plant with floor conveyors for moving molds and overhead apparatus for sand handling equipment.

Three 30-ton acid open hearth furnaces are used. Production of finished castings averages 70 tons per 8 hour day. Machine shop, offices and foundry cover 10 acres

It is a good place to work for many reasons including the most modern lighting arrangement obtainable; an emergency hospital with a nurse on duty at all times; and a full-time safety engineer to check on job hazards.

Outstanding among the many Herman molding machines used in this plant are the two 10,000 pound capacity machines that have produced hundreds of thousands of railroad side frames and bolsters. Their performance is typical of the rugged construction and dependability of all Hermans, no matter what capacity machine is used.

Remember that on all Hermans no power is required for the roll-back operation; one rotary valve handle controls the complete operation; there is pressure lubrication to each moving part; and they've made their way by the way they're made. May we hear from you?

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MOLDING MACHINES

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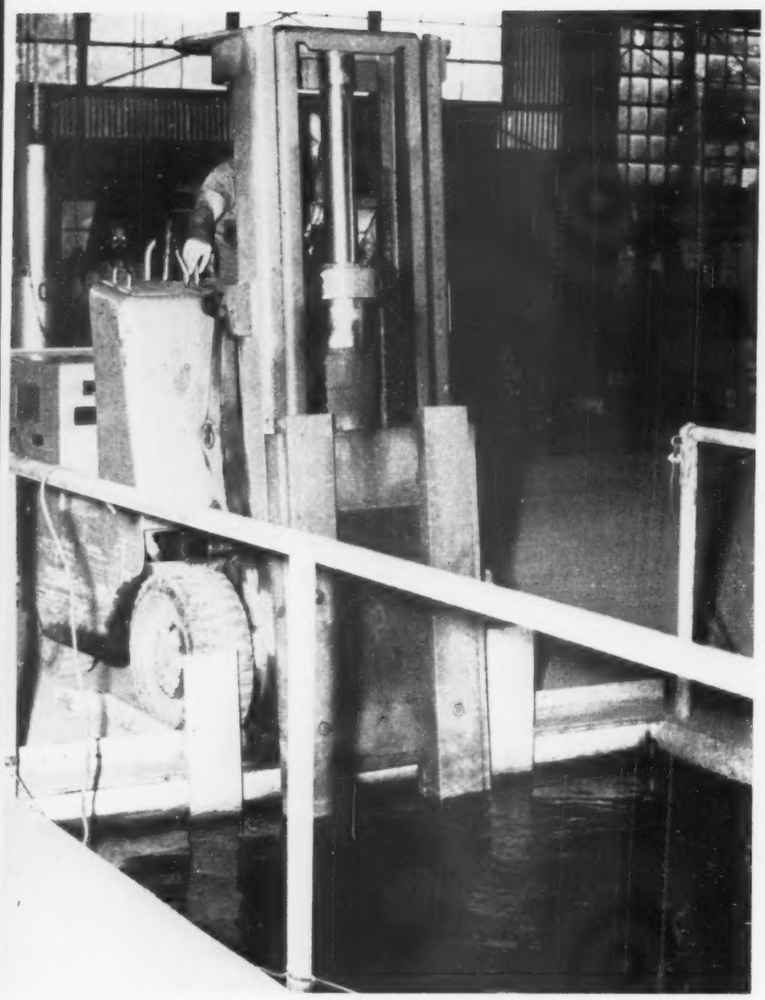


Truck holds castings in quench tank with forks at the maximum downward position. Note guide rails and stops

Extra long, heat treated forks reach all the way into furnace to remove annealing skid load of hot castings

Cloud of steam arises as red hot castings enter quench water. Operation must be performed quickly to prevent cooling them in air and insure fast, complete immersion

Fork Truck Simplifies Handling

in Quenching Steel Castings

MANY novel industrial applications have been developed for the conventional fork lift truck, but to date most of them have been designed to augment the truck's unique ability to raise loads above the floor for easy transport and storage.

Now, however, a midwestern foundry has conceived an application for a fork truck which is a radical departure on two counts. First, the truck lowers loads below floor level instead of above. Second, it plays a direct part in the processing of the product rather than in the auxiliary function of transport and storage.

The foundry employing this truck makes a wide variety of steel castings ranging in size from a pound to more than a ton and which frequently require heat treating. Recently production increases necessitated revamping the heat-treating department to permit handling a larger volume. While casting about for ideas to modernize these facilities, the staff conceived the idea of using a special fork truck. The idea has paid off in faster, more economical processing.

The accompanying illustrations show how this system works. Annealing skid loads of castings are placed in the heat-treating furnace by a specially designed 6000-lb capacity, electric-powered fork truck manufactured by the Elwell-Parker Electric Co., Cleveland. At the end of the heating period, the furnace door is raised and the load on the skid is removed and transported to the quench tank, which is located below floor level.

There the specially designed forks and elevator mechanism of the truck are employed to lower the load into the tank. It is held there on the truck's forks for the prescribed period of time, then removed and transported to another furnace or to storage to await further processing. The entire process is performed with the fork truck; once on the annealing skid, the castings need not be touched until the heat treatment is complete.

There are several obvious advantages to this method of operation. Manual handling is limited to placing castings on the skid at the start.

(*Concluded on page* 216)

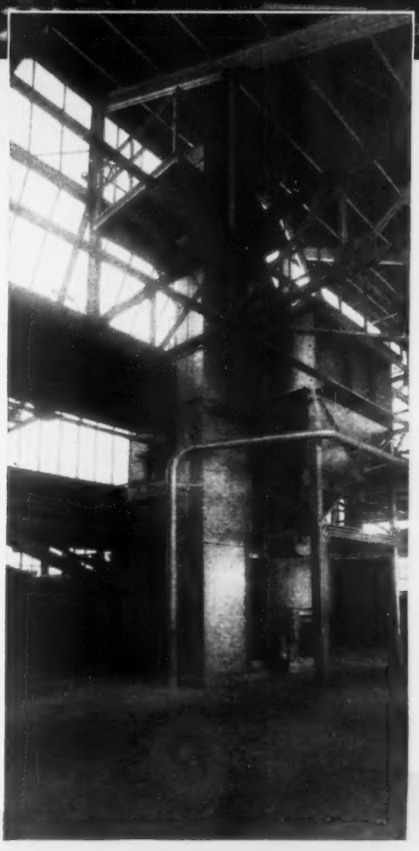
COMPLETE SAND HANDLING SYSTEMS

planned
designed
fabricated
installed
serviced

BY
NEWAYGO
ENGINEERING CO.

A complete sand handling system. Shakeout sand elevator, overhead storage, and mullers in background. Conditioned sand is delivered to overhead molding hoppers. Completed molds are set out on gravity conveyors for pouring from overhead monorail cranes. System handles 60 tons of sand per hour.

This unit is the heart of a sand handling system. Elevator carries shakeout sand to screen and bin conditioning unit. Sand passes into muller in batches as required. Prepared sand is delivered by conveyor to molding hoppers. This unit is designed for large or small systems.



are you planning a new or improved

Here are 4 important reasons why the NeWay plan is the right way and profitable way to modern, efficient, low-cost sand handling:

Free engineering layouts, service and estimates *by practical engineers.*

Single contract efficiency with one company responsible for fabrication, installation and erection.

A complete staff of *service engineers* on 24 hour call.

A 40-year record of proven ability.

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& Mfg. Co.
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Chicago 7, Illinois
OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

(*Concluded from page* 214)

Several furnaces can be serviced by one piece of equipment which can be used for other handling jobs in the plant when it is not required in the heat treating department. Considerable time is saved because loads need not be transported from one handling device to another. The same trucks provide a safe convenient means of furnace loading, material transport and quenching.

Electric power is preferred by the user because of its economy and smooth operation in the presence of heat. With the aid of extra batteries, the quench truck operates around the clock and is probably in use 23 hours per day.

Illinois Tech Advisory Group Named by FEF

Nineteen foundry specialists and educators have been named by Marion J. Allen, president of the Foundry Educational Foundation, to serve as advisors to Illinois Institute of Technology, one of the 14 FEF-affiliated engineering schools. The committee will advise interested Illinois Tech engineering students on their scholastic programs and will carry out other local functions of the foundation.

H. A. White, manager, Smeeth-Harwood Co., Chicago, is chairman of the committee. Others, also from Chicago, who represent the foundry industry, include: Marion J. Allen, assistant to the president, American Steel Foundries; G. L. Larsen, general superintendent, the Crane Co.; Chester V. Nass, vice president, Beardsley & Piper Division, Pettibone Mulliken Corp.; Frank D. O'Neil, treasurer, the Western Foundry Co.; G. P. Phillips, general supervisor of the foundry, International Harvester Co.; Lawrence D. Pridmore, treasurer, International Molding Machine Co.; Elmer A. Rich, American Wheelabrator & Equipment Co.; James Thompson, chief engineer, Continental Foundry & Machine Co.; L. J. Wise, vice president, Chicago Malleable Castings Co.; B. C. Yearley, assistant manager, National Malleable & Steel Castings Co.; and Lester B. Knight, president, Lester B. Knight & Associates Inc. Committee member from Milwaukee is W. R. Tanner, president, Zenith Foundry Co.

Representatives of the committee from Illinois Institute of Technology are: Stewart S. Howe, vice president in charge of development and public relations; Earl C. Kubicek, director of placement; David W. Levinson, instructor in metallurgical engineering; Lucio F. Mondolfo, professor of metal-

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lurgical engineering; and Otto Zmeskal, director and professor of metallurgical engineering. Gordon L. Johnson, associate physical chemist, Armour Research Foundation, will also serve as a member of the committee.

Foundry Cost Accounting Discussed at Meeting

At the annual business meeting of the Cleveland Chapter of the National Association of Cost Accountants held at Hotel Carter, Cleveland, Albert E. Grover, cost consultant for FOUNDRY, was principal speaker and Clayton D. Hatch, assistant works manager of Warner & Swasey Co., at New Philadelphia, O., was program chairman.

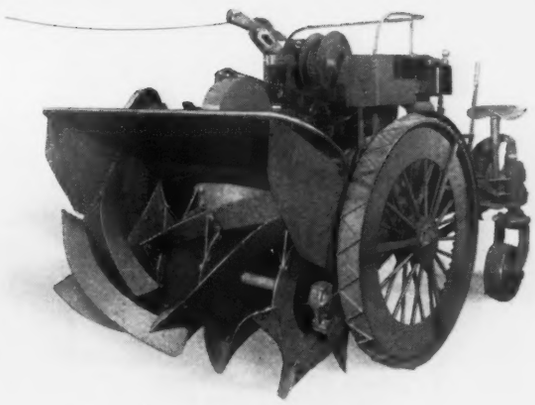
The speaker first outlined his method for determining the "normal" operating rate for a company and then discussed the method of allocating costs on building expenses, equipment depreciation, maintenance, power, labor, research and engineering development. He continued with suggestions on figuring costs on machine shop operations, in heat treating, plating and also the marketing of a product. In allocating administrative expenses, Mr. Grover believes such expenses should be charged to the department on which the executive spends the greatest amount of his time. He concluded with illustrating types of forms he has developed for assembling this information and having it available for comparison on a monthly, quarterly, and yearly basis.

Book Review

The Measurement and Control of Temperatures in Industry, by R. Royds, cloth, 260 pages, 6 x 9 in., published by Chemical Publishing Co. Inc., New York. Price $5.

Designed to cover the latest developments in temperature measurement and control for the metal, chemical, glass and refractory and many other industries, this volume discusses various methods and equipment available. Space devoted to standardization and automatic control of temperatures shows how to improve quality and reliability of industrial products, increase rate of production, and save fuel and labor by the application of automatic temperature controls.

This work is a revision of *The Measurement of Steady and Fluctuating Temperatures* and includes important new developments and emphasis. It contains 116 illustrations, including graphs, tables and equations for calculating results which are intended to be of help to engineers.



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WHITING ENGINEERING

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Cost Reducing

INSTALLATION

This Whiting Gantry Crane at National Farm Machinery is making up a metallic charge in the iron weigh hopper.

NATIONAL FARM MACHINERY COOPERATIVE, INC. MECHANIZES CHARGING AND INCREASES MELTING CAPACITY!

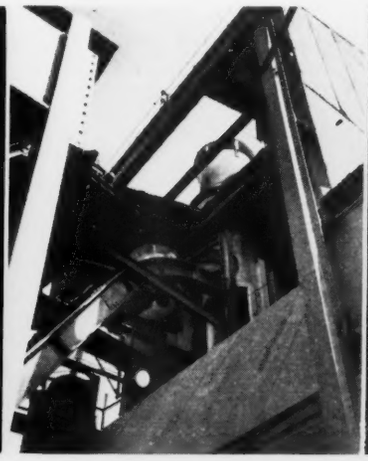
There's good reason for efficient charging and melting operations at National Farm Machinery Cooperative, Inc., Bellevue, Ohio, where two basic lined cupolas are being run. Several years ago, their engineers got together with Whiting engineers and properly planned the installation. Thus, National Farm Machinery obtained the benefits of the many years of Whiting experience and the results prove that such action was wise. Charging and melting fit in perfectly with all other operations and the desired higher production and lower costs have been realized.

Here is how the system operates. The stockyard outside the cupola building is served by a Whiting Gantry Crane. Incoming raw materials—scrap, steel, coke and limestone—are unloaded from railroad cars by the crane; iron and steel by magnet, coke and limestone by grab bucket. The metallic charge is made up in the iron weigh hopper and discharged into the Whiting charging bucket, which is positioned directly beneath the weigh hopper. Coke and limestone are also weighed in the iron weigh hopper and directed to the hopper from the storage bins by an inclined retractable chute. A skip hoist carries the bucket to the charging position in either of the two Whiting cupolas.

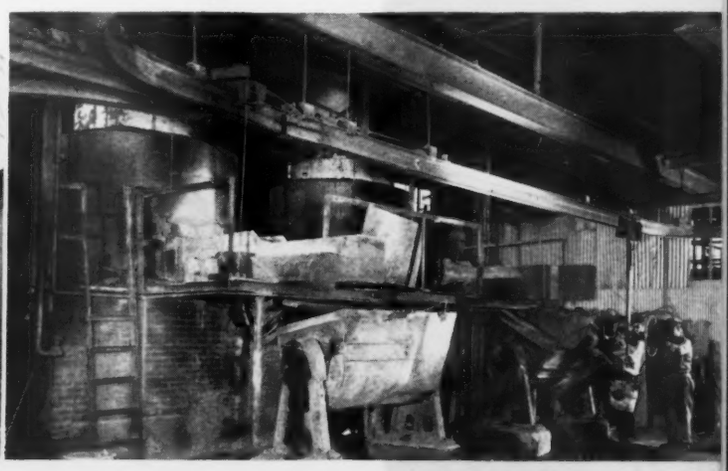
Let Whiting Foundry Engineers help you plan your mechanization program! Write today for their services!

WHITING CORPORATION
15607 Lathrop Ave., Harvey, Illinois

The Whiting double-leaf, drop-bottom bucket is descending after discharge.



A view of the two Whiting Cupolas at National Farm Machinery Cooperative, Inc.



WHITING

UNDRY EQUIPMENT

Other Whiting Foundry Products include: Cupolas • Cupola Spark Supressors • Cupola Hot Blast Equipment • Cupola Blast Moisture Control Equipment • Cupola Charging Systems • Cupola Coke Igniters • Cradle Furnaces • Converters (Steel) • Duplex Melting Systems • Air Furnaces • Electric Melting Furnaces • Ladles • Ladle Handlers • Wet-type Dust Supressors • Tumbling Mills • Annealing Ovens and Cars • Pulverizers • Pulverized Coal Firing Systems • Turntables • Electric Traveling Cranes • Trackmobile • Trambeam Overhead Handling Systems • Electric Chain Hoists

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Activities of Foundry

GROUPS

Chicago

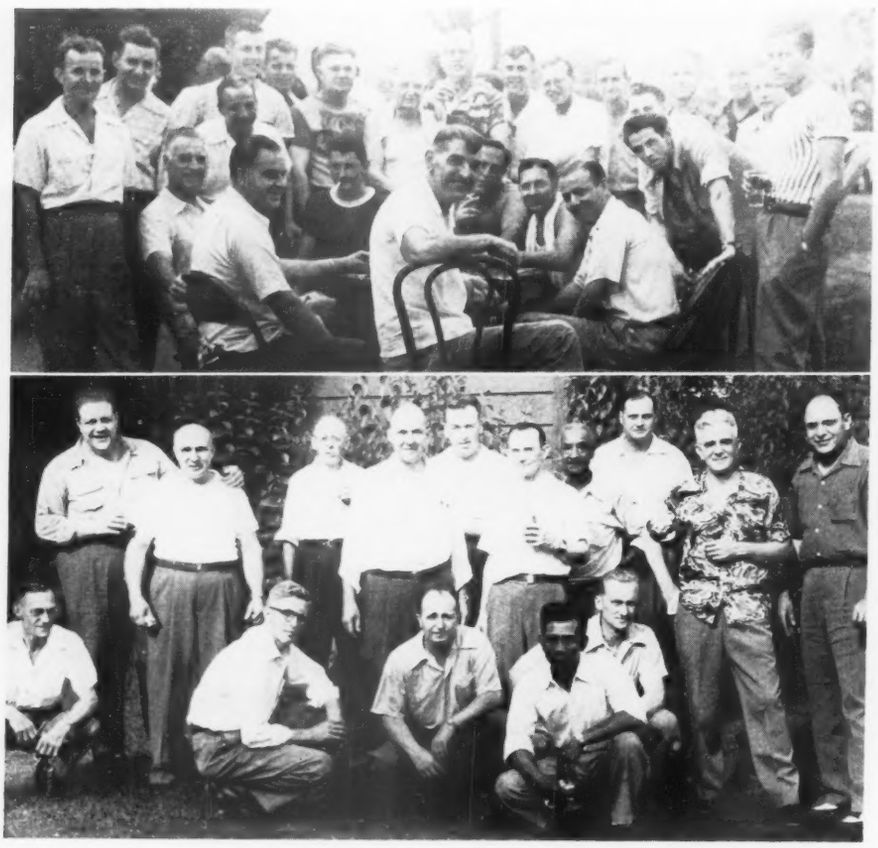
WITH even the weatherman cooperating, the Chicago Chapter of AFS attracted 1100 members and guests to its annual stag outing and golf match. Lincolnshire Country Club in Crete Township, Ill., was the site of festivities at which there were approximately 100 more in attendance than at last year's gathering.

Golf was the main attraction for the majority, but a goodly number participated in the afternoon horseshoe pitching contest. For the non-athletically inclined, entertainment was provided by a strolling instrumental trio.

A weight guessing competition provided considerable interest through the day. A group of five castings, consisting of one each of magnesium, aluminum, bronze, gray iron and steel and weighing a total of 160 lbs 6 oz, was displayed. Honors in the contest were split three ways, with A. Livovich, United States Steel Co., J. Balogh, Vierling Steel Works, and Herman Boots coming up with identical "guesstimates" of 160 lbs.

At 7 p.m. a country fried chicken dinner was served in the big tent erected adjacent to the clubhouse. This was followed by awarding of prizes to the golf and horseshoe winners and to holders of lucky ticket stubs. The party concluded with a floor show. Chairman of the entertainment committee and in charge of arrangements for this outing for the fifth straight year was Robert M. Jones, superintendent of foundries, South Works, United States Steel Co. Secretary of many years' standing was Harry E. Cullen, director of recreation for the same company.

Other members of the committee are: Robert A. Aeberly, Electro Metallurgical Division, Union Carbide & Carbon Corp.; G. Becker, Hewitt-Robins Inc.; Robert H. Burnell, Federal Foundry Supply Co.; Frank B. Flynn, S. Obermayer Co.; J. C. Gore, Foundry Products Division, Archer-Daniels-Midland Co.; C. C. Kawin, Charles C. Kawin Co.; T. J. Magnuson, J. S. McCormick Co.; S. E. McGinty, Firegan Sales Co.; A. A. Milkie, Hewitt-Robins Inc.; N. L. Mooneyham, Kordell Industries Inc.; Harry G. Schlichter, Beardsley & Piper Division; Eugene W. Smith, Eugene W. Smith Foundry Materials; and H. K. Swanson, Swanson Pattern & Model Works.—*Erle F. Ross.*



CENTRAL OHIO Chapter of the AFS held its eighth annual picnic June 28 at the Columbus Riding Club, Columbus, O. with about 200 present. Photos by courtesy of Wilfred H. White, Jackson Iron & Steel Co.

Northeastern Ohio

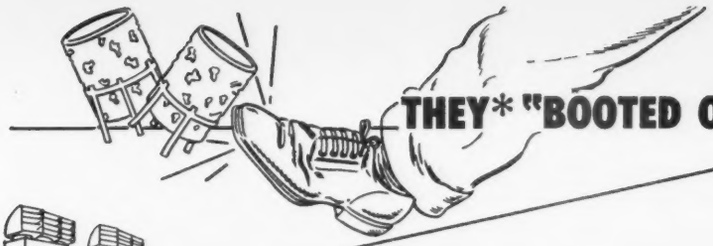
OVER 175 members and guests attended the clambake and technical meeting which opened the 1952-53 season of Northeastern Ohio Chapter of the AFS at the Tudor Arms Hotel, Cleveland, Sept. 11.

After a social hour, the dinner and a short recess, members reconvened to hear William Hisey of the public relations department, Goodyear Tire & Rubber Co., Akron, O., deliver a talk on "The Road Back." Inspirational in nature, Mr. Hisey's address dealt with his concern for values which he feels America has been losing for over 20 years and which he feels must be regained before the country can get back on the road originally mapped out and started down by the nation's founders.

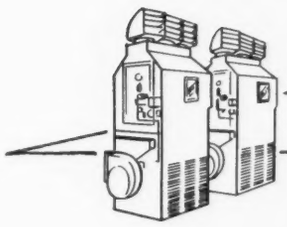
He pointed out that the men who dreamed of America as a place where all men could live in freedom and peace, as God meant the whole world to live ultimately, felt that the only way to achieve what men desire and God intended is through work. Mr. Hisey pointed out that today too many of us are likely to feel that there is an easier, faster way to satisfy those needs and that work is somehow without dignity, to be avoided, or, if it cannot be avoided, to be called by some more euphemistic name.

He listed men's basic needs as security, a chance to improve themselves, the maintenance of their personal dignity and an appreciation of

(*Continued on page* 223)



THEY* "BOOTED OUT" SALAMANDERS



THEY INSTALLED DRAVO HEATERS

THEY SAVED $4,372.00 PER YEAR

*Rosedale Foundry and Machine Company, Pittsburgh, Pa.

Like many other metalworking plants, Rosedale, producers of Meehanite Metal castings, depended for years on salamanders for heating. Everyone *assumed* that any more modern method would cost too much, and probably couldn't heat the high-roofed, metal structure much better anyway.

But no one was happy about the situation. Coke and labor were big cost items. Production was lost while men "thawed out." Air was smoky and sulphurous.

So Rosedale investigated, and found (1) that Dravo *Counterflo* Heaters could do the job for LESS cost than salamanders, (2) that Dravo was already heating many similar structures with complete satisfaction, and (3) that Dravo Heaters would help clear up the polluted atmosphere.

Result: four Dravo *Counterflo* Heaters were installed, eliminating 3 salamanders. Yearly cost-reduction is $4372. Even with 25% annual amortization, this company is currently saving $500 a year. After four years the investment will be completely written off, and the entire saving will be velvet. The indirect savings—improved production, greater employee comfort, elimination of coke fumes, and saving in floor space—are extra dividends. Everybody's happy about the heating now.

No one can afford, today, to put up with old-fashioned, inadequate heating equipment—any more than to use old-fashioned production machines. Let us review your heating problems, and provide you with some specific examples of the savings Dravo *Counterflo* Heaters are making for others—and that they can make for you. Consult your classified telephone directory for the name of the local representative—or write us direct, ask for bulletin MR 523.

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Dravo also manufactures the *DRAVO CRANE CAB COOLER* for air conditioning hot-metal crane cabs.

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(*Continued from page* 220)

their work. Personal, individual responsibility and action were stressed as the key to the kind of future which will insure these things. He went on to assert that the people of America and the world need faith "in God, in country, in other men and in themselves," that they need vision and a belief in progress achievable through work.—*Jack Miske*

All-Canadian Conference Planned for Nov. 6-8

Under the joint sponsorship of the Ontario and Eastern Canada Chapters of AFS, the fourth All-Canadian Foundry Conference will be held at Montreal, Nov. 6-8. Registration will be at the Mount Royal Hotel, but some of the technical sessions will be at the Montreal Technical School. The program includes discussions on both ferrous and nonferrous foundry practice and features visits to several outstanding foundries in the Montreal district.

Proposed schedule for the three-day conference is as follows:

Thursday, Nov. 6

Forenoon—Registration, Mount Royal Hotel
Midday—Luncheon, Mount Royal Hotel
Afternoon—Plant visits leaving from Mount Royal Hotel and including: Crane Ltd., Dominion Engineering Works Ltd., Robert Mitchell Co. Ltd.
Evening—Technical session, Montreal Technical School
"Effects of Gating Design on Casting Quality," by S. C. Massari, technical director, American Foundrymen's Society. This features Part III of the AFS research series, "Fluid Flow in Transparent Molds."

Friday, Nov. 7

Forenoon—Plant visits leaving from Mount Royal Hotel and including: Canadian Car & Foundry Co. Ltd., Longue Pointe; Montreal Bronze Ltd.; Warden King Ltd.
Afternoon—Technical session, Mount Royal Hotel
Gray Iron: "Cupola Practice," by Tom Barlow, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago
Nonferrous: "Brass and Bronze," by M. J. Davidson, Canada Metal Co.; "The Comparative Foundry Characteristics of Magnesium and Aluminum," by M. N. Martinson, Light Alloys Foundry
Steel: "Acid Electric Melting," by John Juppenlatz, Lebanon Steel Foundry, Lebanon, Pa.
Evening—Banquet and floor show, Mount Royal Hotel

Saturday, Nov. 8

Forenoon—Technical session, Montreal Technical School
Gray Iron: "Cupola Practice, Part II," by Tom Barlow, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago
Nonferrous: "Rapid Tests in Melt Quality during Melting Operations," by H. H. Fairfield, Wm. Kennedy & Sons Ltd., Owen Sound, Ont.; "Gates and Risers for Permanent Mold Castings in Aluminum," by J. Ramsden, Ramsden Mfg. Co., London, Ont.
Steel: "Molding Methods," by John Juppenlatz, Lebanon Steel Foundry, Lebanon, Pa. Mr. Juppenlatz will include some information on hot tears in this paper.

Gray Iron Founders To Meet in Cleveland

Gray Iron Founders' Society will hold its 24th annual meeting at Hotel Cleveland, Cleveland, Oct. 16-17. Program of the two-day conference will cover discussion of the industry's current problems and primary interests as they affect management and labor today and in the future.

Society President E. L. Roth, president, Motor Castings Co., Milwaukee, will preside at the meeting, which will open at 9:30 a.m. Oct. 16. In addition to reports of officers and

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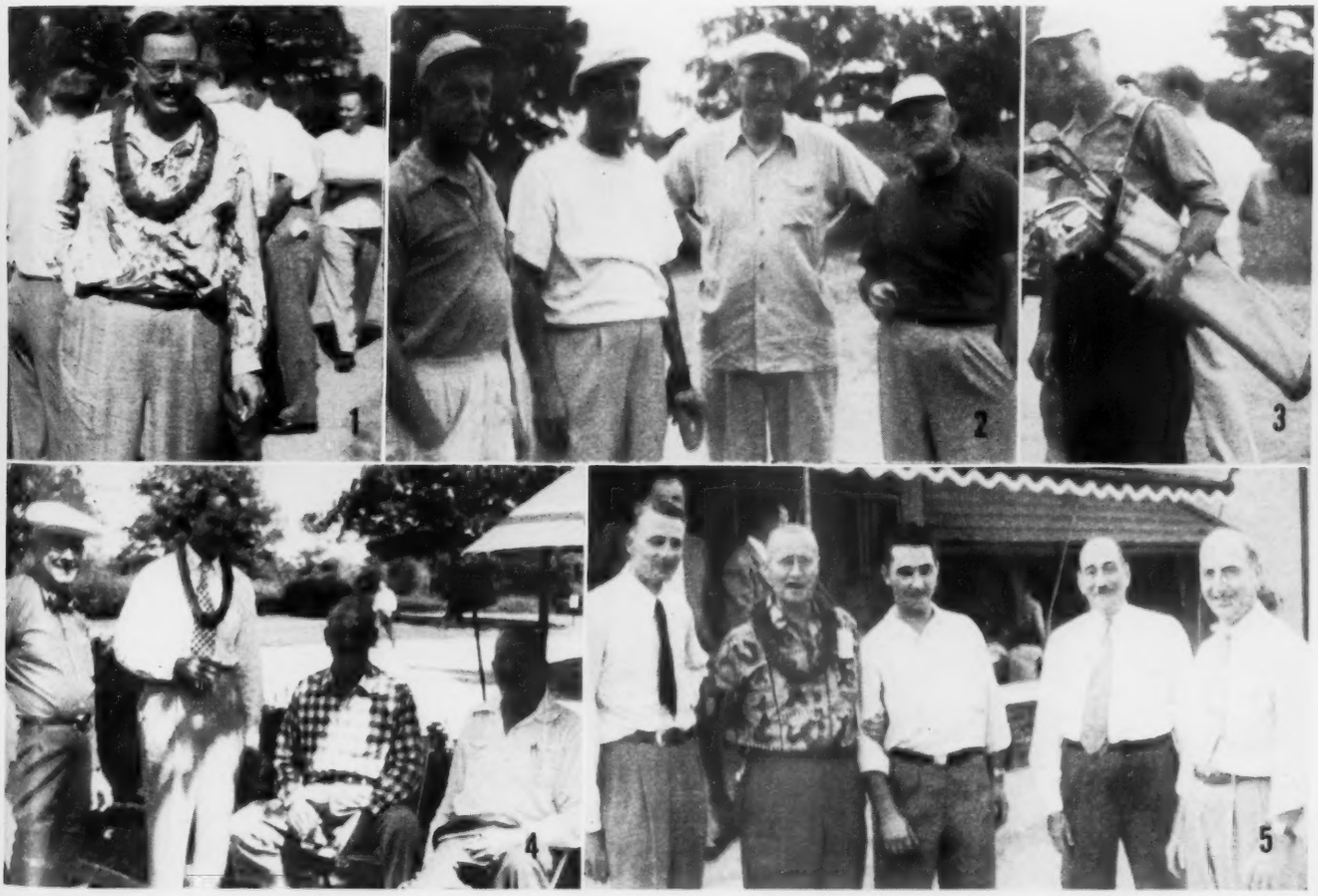

CHICAGO Chapter of the AFS held its annual stag outing and golf party at Lincolnshire Country Club, near Chicago, Aug. 9. J. C. Lunkes, Kordell Industries Inc., is shown in Fig. 1. At right in Fig. 2 is Fred Skeates, Link-Belt Co., with his golf foursome. E. Nelson, second from left, was first prize golf winner in Class A. Harold G. Haines, Semi-Steel Division, Howard Foundry Co., is shown in Fig. 3. Fig. 4, left to right, are: Harry E. Cullen, entertainment committee secretary; John H. Owen, Harbison-Walker Refractories Co. and chapter president; Robert H. Jones, U. S. Steel Co., entertainment committee chairman, and H. G. Schlichter, Beardsley & Piper Division, Pettibone Mulliken Corp., entertainment committee member. At Fig. 5 is a group from Beardsley & Piper Division with C. V. Nass at the right. Photos are by courtesy of Deming H. Lucas, foundry suppliers' representative

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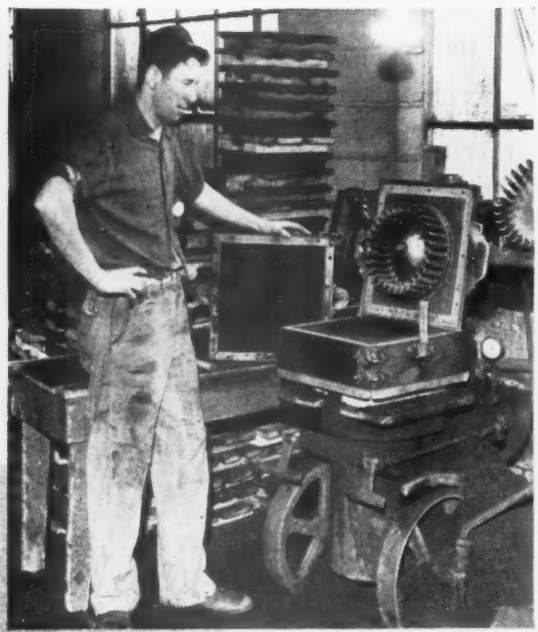
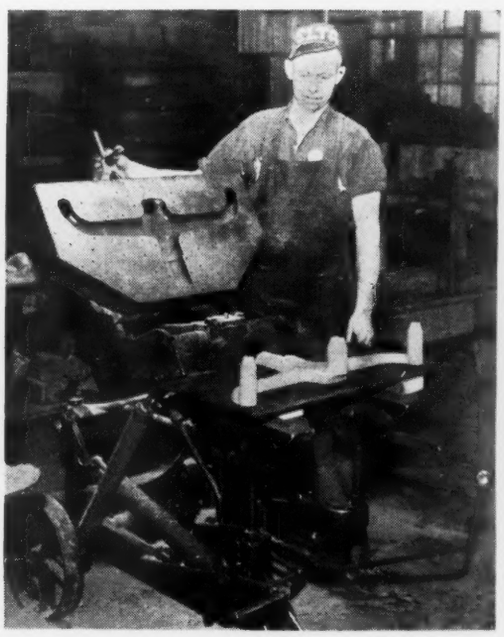
INTERNATIONALS

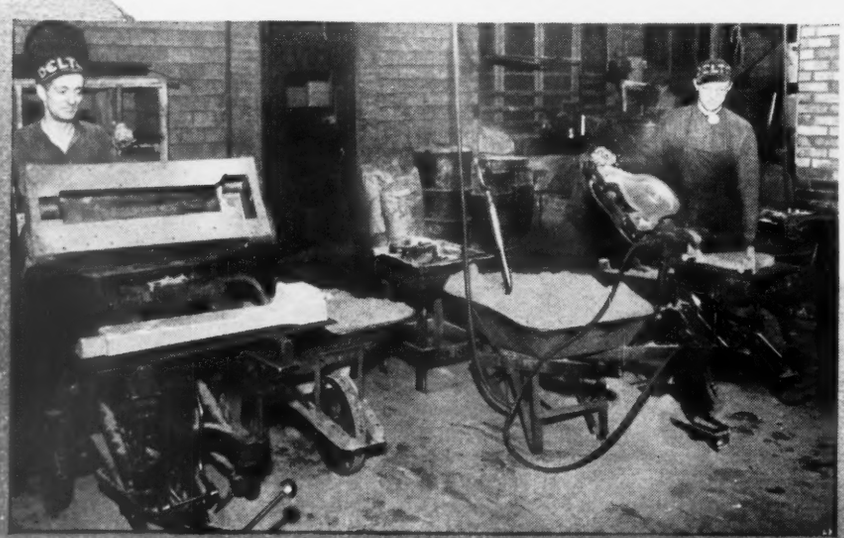
International Molding Machine Company **La Grange Park, Illinois**

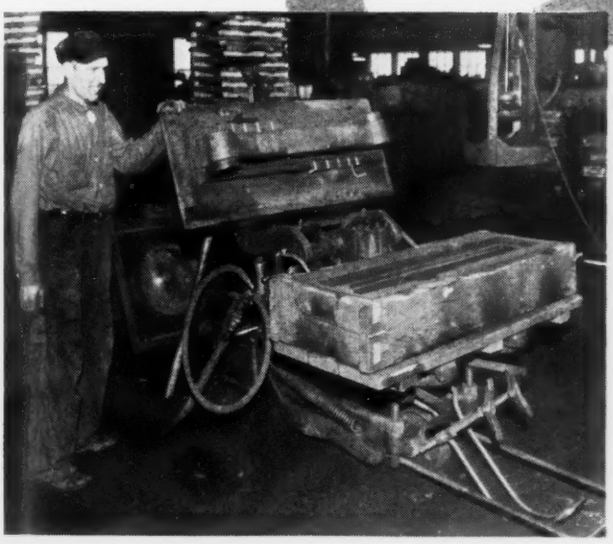
If you have a foundry problem . . . call our Service Engineer
He knows the answers from practical foundry experience

Photographs taken at J. E. Gilson Company, Port Washington, Wisconsin









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committees, and consideration of topics relating to the gray iron industry, a panel discussion by quality control experts will describe how to install, operate and get maximum benefits from a quality control program in large, medium and small foundries. Representatives of government agencies, including the NPA and OPS, will present the latest information from Washington.

Details of the tentative program follow:

Thursday, Oct. 16

8:30 a.m. Registration
9:30 a.m. Business session:
Report of the president—E. L. Roth, Motor Castings Co., Milwaukee
Report of the treasurer—H. J. Trenkamp, Ohio Foundry Co., Cleveland
Report of the executive vice president—Donald H. Workman
Report of technical director—C. O. Burgess
Reports of committee chairmen
Report on National Castings Council—E. L. Roth
Report on Gray Iron Advisory Committee to NPA—Walter Seelbach, Superior Foundry Inc., Cleveland
Report on Gray Iron Advisory Committee to OPS—C. R. Culling, Carondelet Foundry Co., St. Louis
Report on Foundry Educational Foundation—John M. Price, Ferro Machine & Foundry Co., Cleveland
12:30 p.m. Industry Luncheon—Speaker, Carl Taylor, president, Waukesha State Bank, Waukesha, Wis. Subject: "America Tomorrow"
2:30 p.m. Business session:
Panel discussion on quality control. Subject: "Organizing for Quality Control in the Foundry." Chairman, H. W. Stuart, U. S. Pipe & Foundry Co., Burlington, N. J. Speakers: W. J. Sommer, Plainville Casting Co., Plainville, Conn.; T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.
4:15 p.m. GIFS committee meetings
6:30 p.m. Industry banquet

Friday, Oct. 17

9 a.m. Registration
9:15 a.m. Business Sessions
Subject: "Labor Relations is Management's Responsibility." Speaker: George W. Taylor, professor of labor relations, Wharton School, University of Pennsylvania. "Engineering in Your Sales Program." Speaker, W. T. Bean Jr., research consultant, Detroit. "Resume of Price and Materials Control Problems." Speakers A. J. McDonald chief, Ferrous Castings Section, NPA; J. M. Price, chief, Castings & Forging Section, OPS
1 p.m. Industry luncheon
Speaker: Countess Maria Pulaski. Subject: "My Life as a Spy."
Introduction of new officers and directors. Presentation of citations and awards
Presentation of prizes—1952 Redesign Contest

New England Conference Has Varied Program

Basic cupola operation for melting ductile iron, and the application of the shell molding process to nonferrous casting production, are two of the topics included on the program for the twelfth New England Regional Foundry Conference to be held Oct. 24-25 at Massachusetts Institute of Technology, Cambridge, Mass.

In addition, Conference Chairman Robert C. Walker, Whitin Machine Works, Whitinsville, Mass., announced that latest developments in foundry core practice will be reviewed; the new AFS film "Effect of Gating on Casting Quality," will be shown; and effective use of naturally bonded sand will be considered.

Program for the conference follows:

Friday, Oct. 24

9 a.m.—Registration
9:30 a.m.—Opening of conference. Chairman, Robert C. Walker, Whitin Machine Works, Whitinsville, Mass.
9:45 a.m.—Address of welcome, Adm. E. L. Cochrane, dean of engineering, MIT
10 a.m.—Ferrous session: "Melting Ductile Iron in a Basic Cupola," by C. K. Donoho, American Cast Iron Pipe Co., Birmingham. Chairman, Clyde Armstrong, Warren Pipe Co. of Massachusetts, Everett, Mass.; cochairman, Ahti Erkkinen, Builders Iron Foundry, Providence, R. I. Nonferrous session: "Shell Molding as Applied to the Nonferrous Industry," by Bernard Ames, New York Naval Shipyard, Brooklyn, N. Y. Chairman, Frank G. Volpe, Somerville Machine & Foundry Co., Somerville, Mass.; cochairman, Oscar Swangren, Dorchester Brass & Aluminum Co., Hyde Park, Mich.
12 noon—Luncheon, Walker Memorial
1:30 p.m.—"Shell Molding," by William Rose, Borden Co., New York. Chairman, Earl W. Jahns, Production Pattern & Foundry Co.; cochairman, George W. Jackson, Walworth Co., Boston
3 p.m.—Labor relations: "These Mortals," by F. Alexander Magoun, Human Relations in Industry. Chairman, Robert Barker, Rollstone Foundry Inc., Fitchburg, Mass.; cochairman, Alexander Beck, Whitman Foundry, Whitman, Mass.
6 p.m.—Conference dinner. Chairman, Prof. Howard F. Taylor, MIT; cochairman, Thomas I. Curtin Jr., Waltham Foundry Co., Waltham, Mass. Speaker to be announced.

Saturday, Oct. 25

8 a.m.—Registration
9 a.m.—"Foundry Core Practice," by Harry W. Dietert, Harry W. Dietert Co., Detroit. Chairman, Leroy M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I.; cochairman, D. Wesley Case, Belknap Mfg. Co., Bridgeport, Conn.
10:30 a.m.—Ferrous: "Cupola Operation," by Don Reese, International Nickel Co., New York; chairman, Joseph Stazinski, General Electric Co., Lynn, Mass.; cochairman, Jose Grana, Vermont Foundries, Inc., Springfield, Vt. Nonferrous: "Effect of Gating on Casting Quality," AFS film; chairman, Ely Portman, White-Stillman Foundry Co., Providence, R. I.; cochairman, George Labrie, Hampden Brass & Aluminum Co., Springfield, Mass.
12 noon—Luncheon, Walker Memorial
2 p.m.—Sand: "How Can Best Casting Results Be Obtained with Naturally Bonded Sand," by Clyde A. Sanders, American Colloid Co., Chicago; chairman, Albert M. Nutter, E. L. LeBaron Foundry Co., Brockton, Mass.; cochairman, John V. Dohlberg, Kidder Press Co.

Michigan Chapters Outline Conference Program

A program which includes discussions on recent developments in shell molding, magnesium-treated iron and acid cupola operation by nationally recognized authorities in these fields is planned for the Michigan Regional Foundry Conference. Sessions on these and other foundry subjects will be held at the Michigan Union, University of Michigan, Ann Arbor on Oct. 17 and 18.

Sponsoring organizations are the University of Michigan, Michigan State College, Saginaw Valley Chapter, Western Michigan Chapter, Central Michigan Chapter and Detroit Chapter of the AFS. Sessions will be held all day Friday, with a conference luncheon and dinner included in the arrangements. There will be a 2½-hour session concluding the conference on Saturday morning.

Foundry students from the University of Michigan and Michigan State College will be registered as guests of the Michigan foundrymen and will also be their guests at the Friday luncheon.

PHILADELPHIA Chapter of the AFS held its annual golf outing July 25 at the Manufacturer's Golf and Country Club, Oreland, Pa.

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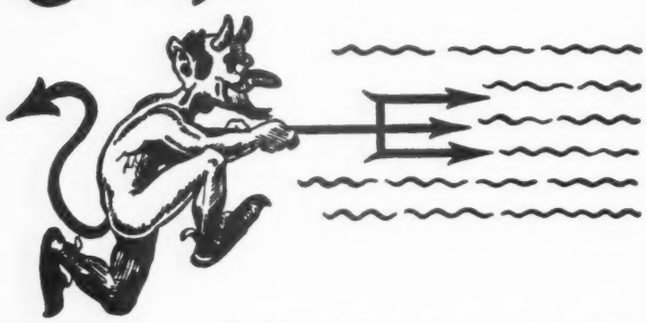

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How to Make a Mold For a Pulley Casting

(Part II)

ABC of Foundry Practice

By PAT DWYER, *Engineering Editor, FOUNDRY*

HABIT and custom are hard masters to escape. That is why a foundry sticks to one method of making certain castings when perhaps half a dozen methods are available and in existence elsewhere. Where a considerable amount of rigging may be involved, a foundry may be justified in retaining a certain method in preference to others, but it is well for a foundryman to familiarize himself with every known method. Then when a question of relative merits of several methods arises in connection with any given job he is qualified to make an intelligent selection.

For example, consider the many methods practiced for making large pulley wheels. Even in the most common method where sweeps are employed instead of patterns, the method has modifications depending on the number of castings and the available flasks or other rigging.

Assuming that the casting is 63 in. diam, and has a 36-in. face and double sets of arms (Fig. 7), usually the most economical method for making the mold is to cheek off the outside and form the arms and hubs in dry sand cores. Pattern requirements will be reduced to a minimum—a sweep for the inside, a sweep for the outside, a corebox for the arms, a corebox for the hubs and a short segment formed on the band saw for imparting a bevel edge to the open sand lifting ring casting. This ring is made first to have it ready by the time it is wanted. Where the cheek flask is a fairly neat fit no lifting ring is needed. A sand strip on the lower edge of the flask will serve.

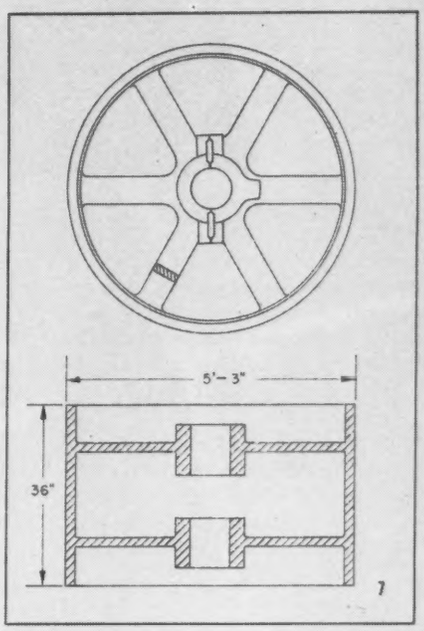

Fig. 7—Plan and sectional views of a double arm cast iron pulley

Allowing for finish and contraction the mold for a 63-in.-diam wheel will be 63⅝ in. diam. Therefore, when setting the trammels for the inside of the lifting ring it will be necessary to bear this in mind. On each side 2 in. is added for clearance and an additional ¾ in. for the contraction of the ring while it is cooling. Altogether the trammels will be set to half a total diameter of 66⅜ in. or 33¼ in. No need to split an eighth of an inch.

Usually the patternmaker does all the measuring with his shrink rule. He supplies the molder with a long stick on which the location of the trammel points are marked. This plan has advantages. However, every foundry does not have a patternmaker at its beck and call. Every molder should be familiar with the tricky little problems involved in the contraction of metal, and competent to do his own measuring, at least in connection with the preparation of foundry rigging.

With the trammels set to the proper radius a ring is scribed on an open sand bed. This ring is a guide for setting the bevel edge segment which forms the inside edge of the lifting plate. The trammel point then is shifted to correspond to the radius of the outside flange on the flask which

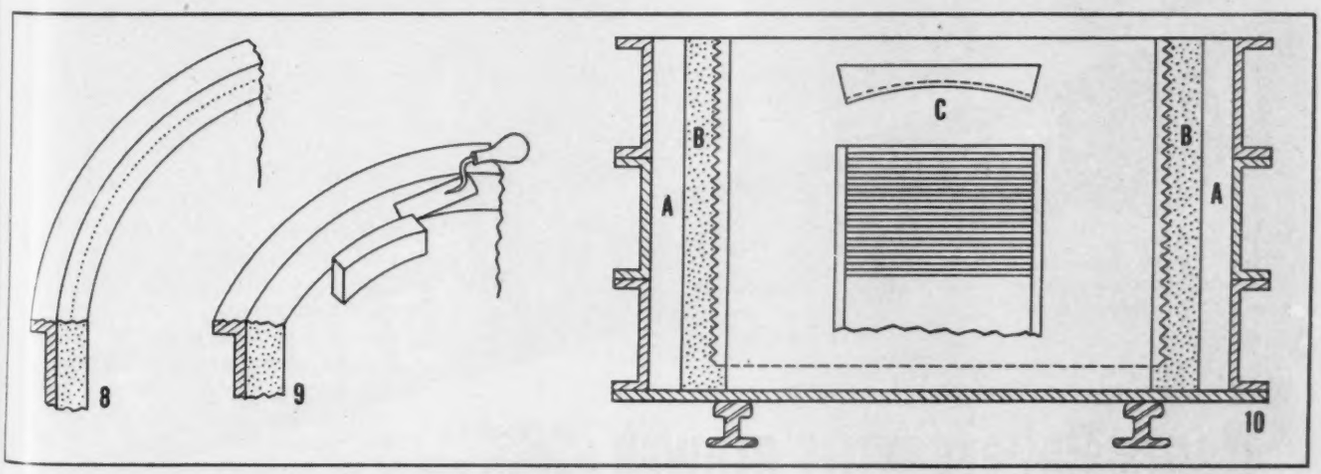

Fig. 8—Sand between pattern and flask is vented with a wire. Fig. 9—Curved wood block enables molder to produce firm top on mold. Fig. 10—Grooved dry sand cores form outside of the mold face

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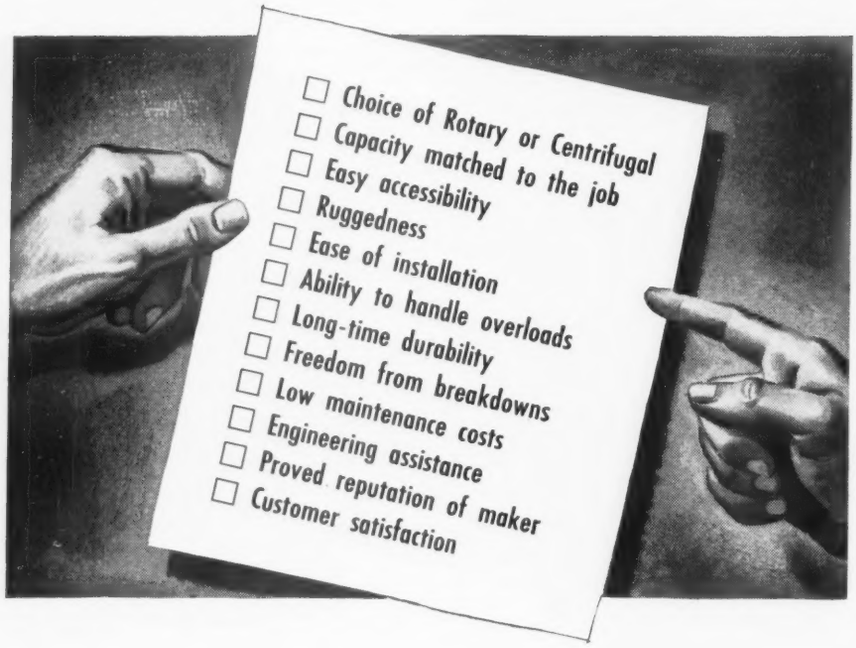

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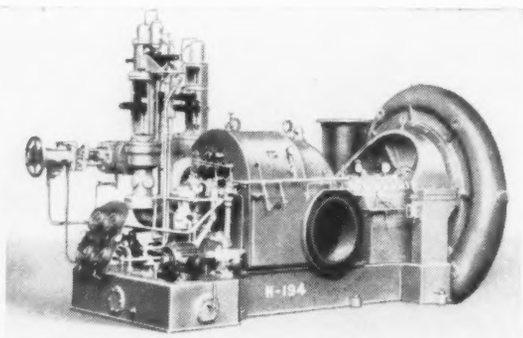

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is to form the cheek of the mold A piece of board, not necessarily the ull width of the lifting plate, plain on the outer edge and beveled on the nner edge, serves as a guide in mak ng up the boundaries of the mold or the lifting ring. Four lugs, 4 x 4 in., are formed approximately at the four cardinal points on the outside circumference of the plate. A half brick may be used as a pattern, or the 4 x 4 in. sand slab may be removed with the trowel. Stakes driven into the sand alongside the lugs guide the cheek into place when the mold is closed.

In making the pulley mold the cheek is swept first, lifted out of the way temporarily until the interior part of the mold is completed. Then it is returned to place and the mold is filled with metal. Although the procedure may be summed up thus briefly, many interesting features present themselves as the work progresses. Unless they are handled intelligently and in proper sequence, they may interfere with the final assembly of the mold, with a consequent defective casting.

Set Vertical Spindle

At the beginning it is necessary to see that the spindle is set up perfectly vertical so that the arc or angle between the spindle and the horizon, as represented by a spirit level, is exactly 90 degrees, or one quarter of a circle. Place the level on the sweep arm. Revolve the arm. When the bubble remains in the center all the way around, the spindle is plumb. If the spindle is not set up properly, it will be difficult if not impossible to lower the cheek part of the mold over the inner part in closing the mold.

When a great deal of sweep work is done, the spindle seats are fixed permanently. The molder does not have to concern himself with problems of that character. If a mold is swept only occasionally, the spindle is set up temporarily. In a few instances a mold may be made when the spindle is not perfectly plumb. These are exceptional cases and represent sloppy practice. The careful molder checks the position of the spindle before starting to use it.

After the spindle has been set a straight sweep is attached to the arm horizontally to sweep a level bed on the floor or the drag part of the flask a little larger in diameter than the lifting plate. In many instances a straightedge may be used. The lifting ring or plate is lowered onto the bed, centered from the spindle, rapped down firmly and staked at the four lugs. Sand is filled in all the way across and butted off lightly.

(*Continued on page* 232)

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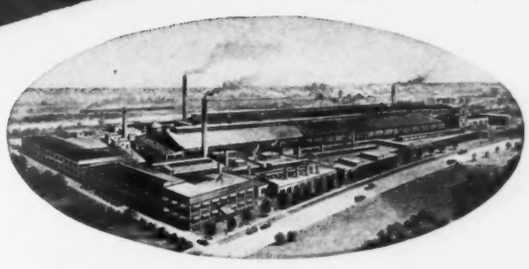

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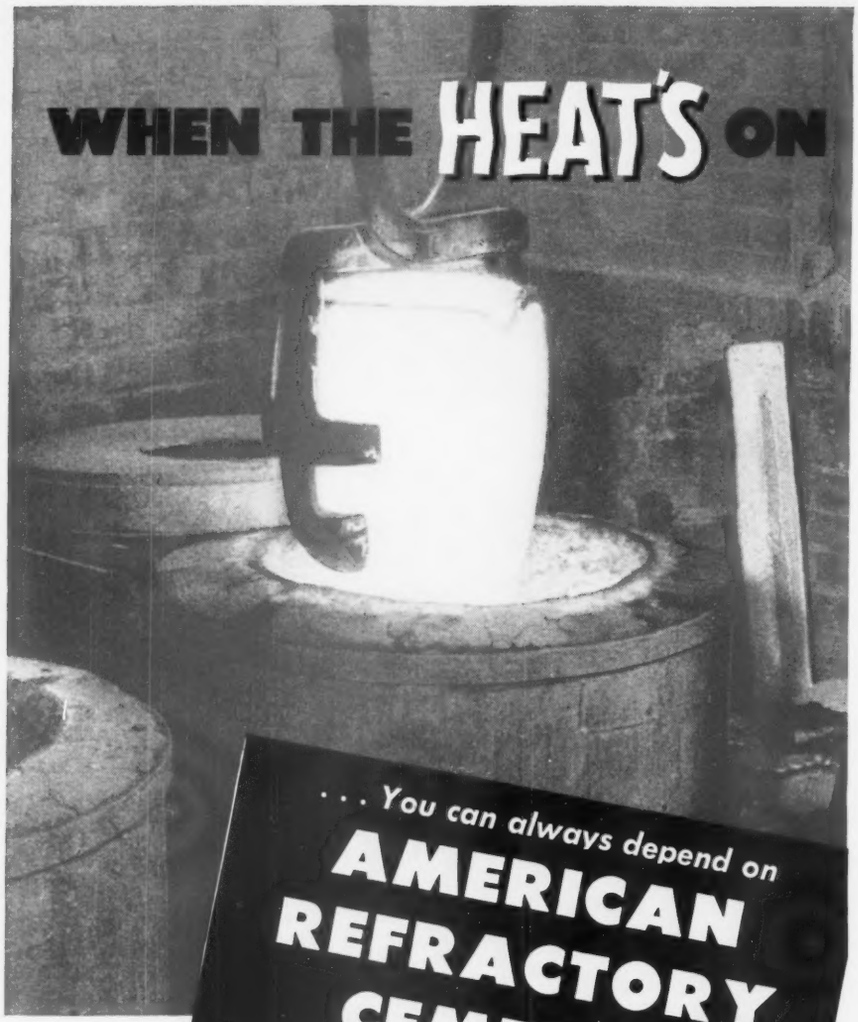

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(*Continued from page* 230)

The horizontal sweep, shifted a little higher on the spindle, is revolved to scrape the sand off flush with the upper face of the lifting ring.

This sweep is removed and replaced by the special vertical sweep designed to form the outside face of the mold. This sweep must be set very accurately, otherwise the diameter of the casting will not meet anticipation. Thickness of the casting rim also will be affected. In this connection it will be well to remember that the greatest strain will be exerted by the metal at and near the bottom of the mold. Therefore the sweep, instead of being perfectly vertical, is set at a slight taper about ⅛ in. closer to the spindle at the bottom than at the top. This taper corresponds to the taper put on a pattern for the double purpose of facilitating withdrawal from the mold, and to forestall and neutralize the anticipated and inevitable strain when the mold is filled with metal. The flask in one or in several sections is lowered onto the plate and centered from the spindle. This is to insure a uniform thickness of sand around the casting to promote uniform cooling of the metal. A section of boiler plate, or any other suitable device bent to the approximate curve of the proposed casting, is employed as a support against which to ram sand. The boiler plate, usually a short section one-sixth of the wheel circumference, is moved around until the required body of sand has been rammed in successive courses as high as the top edge of the flask. The boiler plate or other device is removed and the sweep is revolved several times until the face of the mold is smooth and even. A short wood segment about 2 ft long, bandsawed to the proper contour and laid on the slightly ragged edge, as in Fig. 9, serves as a guide for the molder forming a nice firm edge around the top of the sand wall. Spindle and sweep are removed and the cheek mold is lifted off and finished, black washed and skin dried. The interior part of the mold, but without the lifting plate or hooks, is built up in the manner described previously.

Extent to which artificial venting is necessary depends on the permeability of the sand. If any doubt exists, it may be advisable to use a ¼-in. vent wire to form a ring of vent holes about 3 in. apart from the top to the bottom of the sand outside and about 3 in. back from the face of the mold as in Fig. 8. These vent holes can be driven immediately after the sand is rammed and before the support is removed to make way for the sweep. Small mounds of coke connect the vents of the arm cores from top

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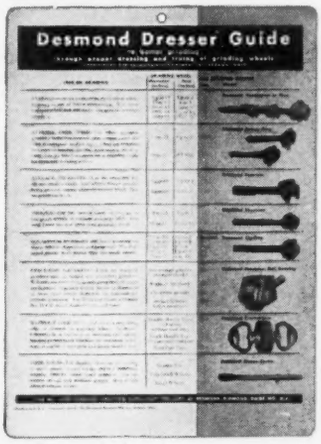

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to bottom, and to the final outlets on top.

The method outlined is an improvement on the first method. After the cheek has been replaced on the drag it is possible to examine the thickness between the inside and outside walls and, if necessary, to pinch the cheek a trifle one way or another. A possible objection to this method lies in the fact that if any soft or weak spots are overlooked on the bottom joint, the metal surely will run out. If the casting were poured from the top, the danger would not be so great. As a general rule castings of this kind are gated at or near the bottom.

A third method for making the mold differs widely from the two previously described. If a spindle and sweep are available, castings can be made either in a floor pit or in a flask. If made in the floor, the spindle seat is set in the bottom of a pit deep enough to bring the top of the mold flush with the floor level. A body of sand approximating the snape of the inside of the mold is built up with the aid of a pattern ring or a section of thin plate bent roughly to the shape. The sweep is attached to the arm and the sand body is shaped to correspond to the inside shape of the casting.

Use Dry Sand Cores

Only the inside of the mold is made in this manner. The outside is made by a number of dry sand cores assembled around the central part of the mold after it has been either skin dried or completely dried. The cores, shown in Fig. 10, are provided with a shoulder top and bottom which regulates the thickness of metal in the casting. After all the cores have been positioned, sand is rammed behind them, thus effectually binding them in place and precluding any possibility of a run-out at the bottom. Procedure is the same when the mold is made in a flask.

Where a ring of any kind with the proper inside diameter is available, it can be used to form the inside part of the mold. If the ring is not wide enough, it may be drawn up repeatedly until the necessary height is attained. The section cores for the outside are made from a half-and-half mixture of new and old core sand bonded with any type of wet or dry binder. Cores may be reinforced with loose rods, or preferably with light cast iron arbors. A couple of light hooks in the top end facilitate handling them either by hand or with a crane. Obviously the set of cores for the outside of the mold can be made and dried more

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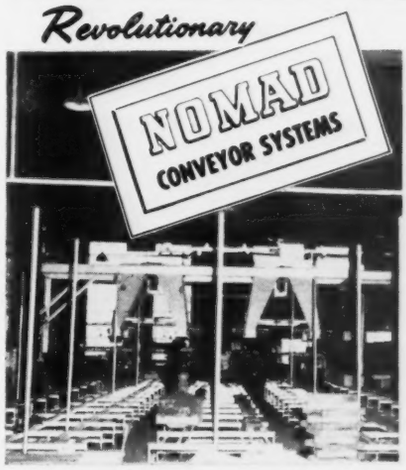

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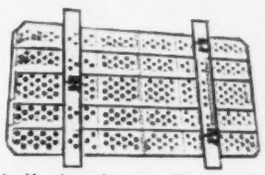

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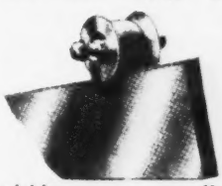

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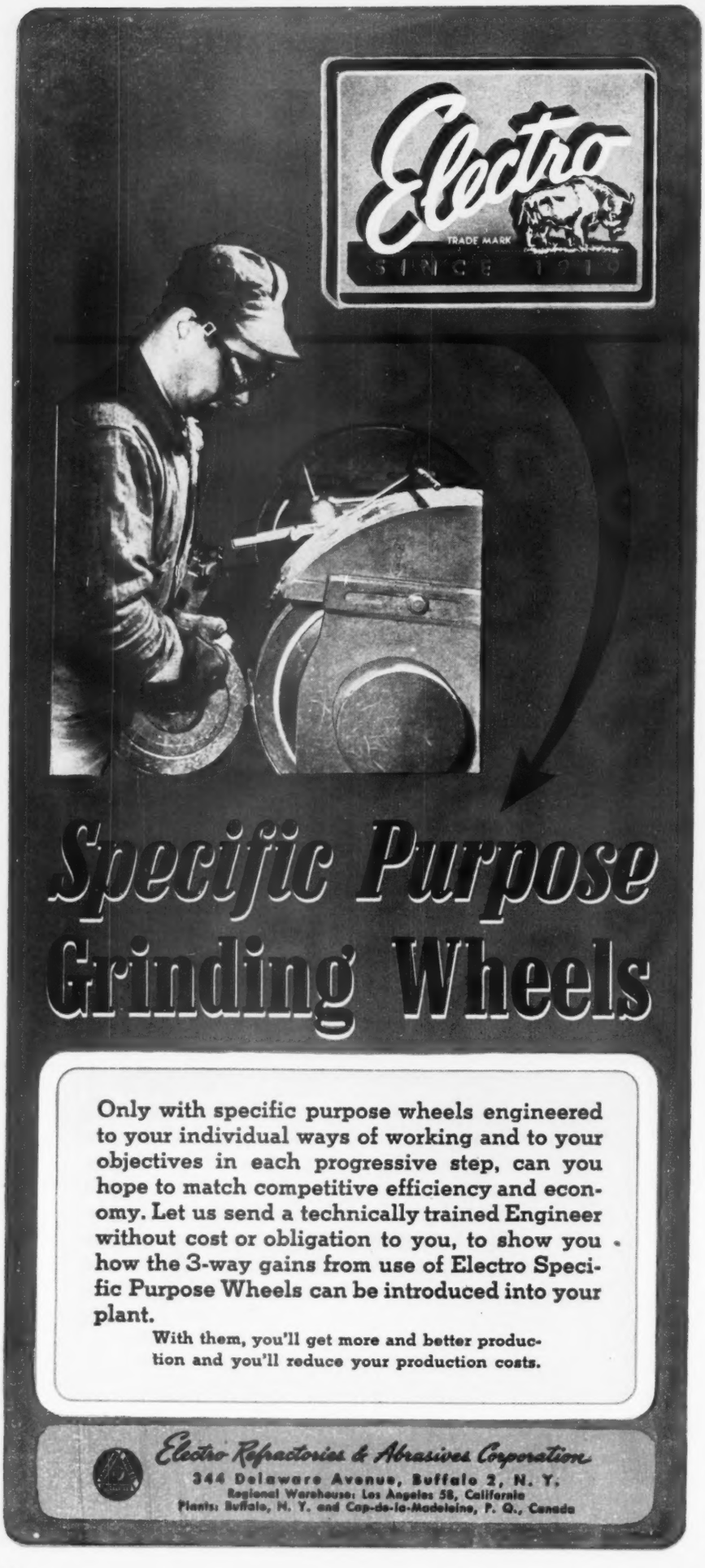
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Plants: Buffalo, N. Y. and Cap-de-la-Madeleine, P. Q., Canada

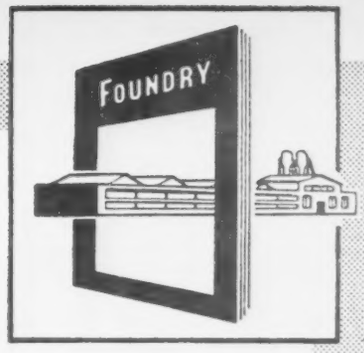
readily than the parts of a big, bulky mold. Another advantage where production time is a factor, is that the mold and cores can be made simultaneously.

If no pit is available in the foundry floor, the mold may be assembled above the floor level. However, in this instance the core or inside part of the mold is built on either a round or square foundation plate supported on a pair of rails or other suitable blocking. This arrangement is shown in Fig. 10. A shoulder on the bottom end of the outside cores guides them into place. A similar shoulder at the top end rests against the inside face of the mold where the top of the mold is to be closed. If this part of the mold is to be left open for reasons mentioned previously, wood thickness pieces or wood wedges are inserted at the top temporarily to hold each core in position until the circle is complete. With the flask sections in position, sand is rammed in the space between the cores and the flask wall. Adjoining core faces are cut on radial lines, therefore when the sand is rammed around them, the cores are held rigidly in place and in a true circle.

Cores forming the outside face of the mold may be plain and straight, or they may be grooved to correspond with the grooves to be machined later in the casting. Each ridge on the core face is approximately ¼-in. less in width and depth than the anticipated machined groove in the casting. In addition to reducing the amount of machine work, the grooved core practically removes the hazard of shrinkage and porosity. This form of defect does not appear—when it does appear—until the casting is completely or almost completely machined. Usual place is opposite the point where an arm joins the rim on the inside.

British Research Group Publishes Proceedings

Papers presented at a conference at Asborne Hill, Leamington Spa in 1951, on the improvement of working conditions in British foundries have been published by the British Cast Iron Research Association under the title *Proceedings of a Conference on Heating, Lighting and Ventilation for Ironfoundries, September,* 1951. Papers included concern dust control, lighting, heating, ventilation and the general improvement of working conditions in foundries. The volume may be purchased from the British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham, England.



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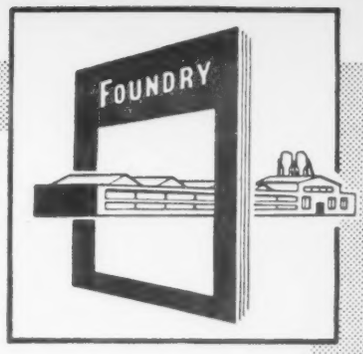

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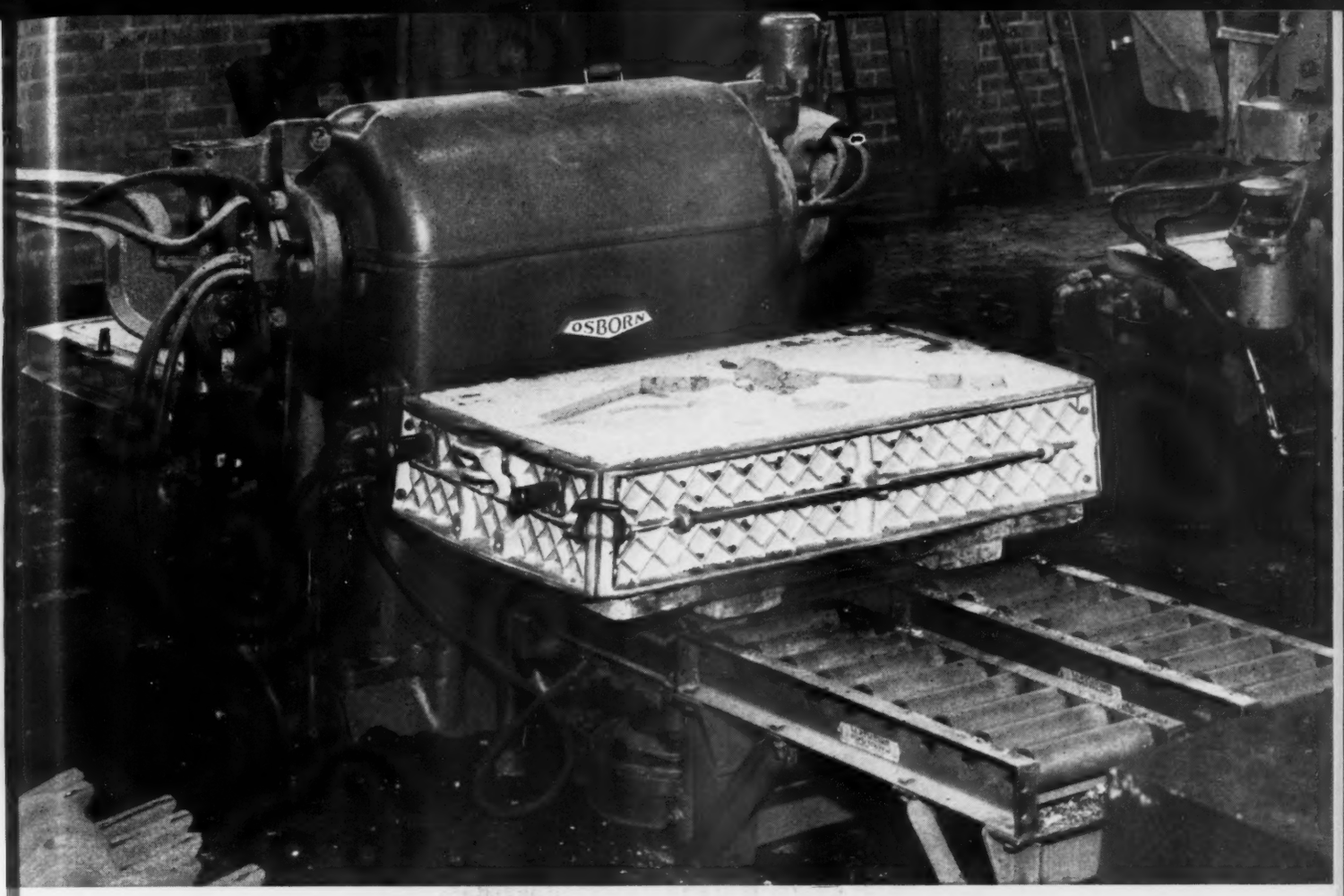

OSBORN Jolt Rockover Pattern Draw Molding Machine produces molds in half the time

IN the steel foundry shown, Osborn's Jolt Rockover Pattern Draw Molding Machine produces as many molds in one shift as were formerly produced in two shifts. Molds are uniformly accurate, resulting in increased production with reduced scrap.

These rockover machines with the open end design provide the flexibility for wide range of flask sizes used by the jobbing and semi-production foundries. The air clamps, oil controlled pattern draw, and air lock levelers are furnished as standard equipment. In addition to a hard, effective jolt, rollers are provided on the draw unit so that the finished molds can easily be removed from the machine.

Why not consult your Osborn factory trained foundry specialist today. He'll gladly put his long experience to work for you and show how you can benefit with new and advanced improvements developed by this 44 year leader in the foundry industry.

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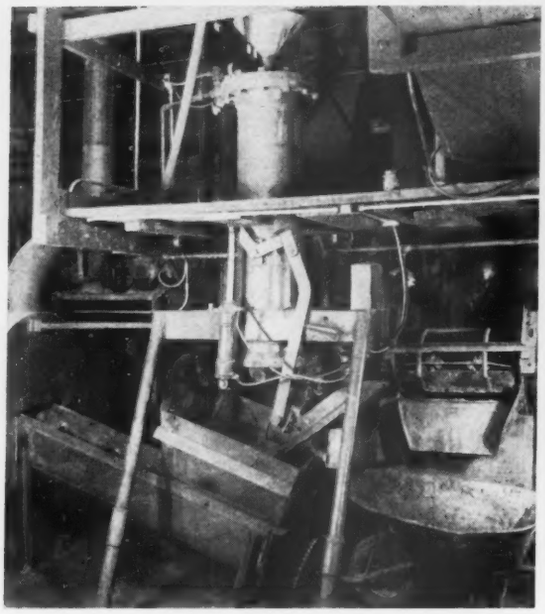
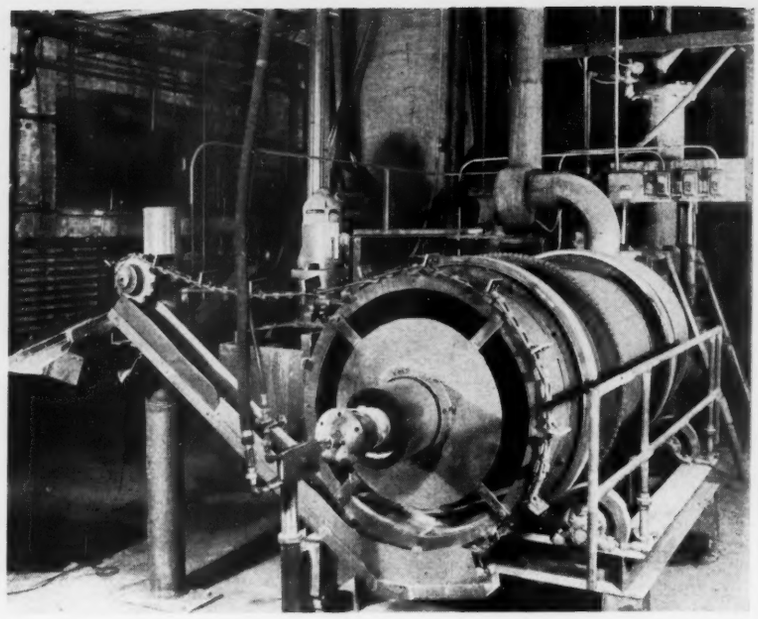


Sand dewatering mechanism reduces moisture content of wet sand slurry from 30 per cent to 7 or 8. Shown are discharge to drier and ejector of sludge removal system



Direct fired laboratory sand drier. Rear shows sand dewatering mechanism on right, wet sand storage tank delivering controlled feed to sand scrubber on the left

SAND RECLAMATION by Wet Methods

By RONALD WEBSTER
Secretary
Hydro-Blast Corp., Chicago

ABOUT 4000 tons of sand which would otherwise have been discarded is being reclaimed daily by wet methods in American foundries. Fifteen years ago there were no operating systems to do such reclamation. Several elaborate systems were installed as early as 1928, but were abandoned, and it was generally felt until 1938 that it was impracticable to produce usable reclaimed sand equivalent to new sand with any existing equipment. Neither the end product nor the equipment developed to produce it was satisfactory. This article is in a sense a progress report.

It had been observed in connection with water sand blast systems that great surges of sand came into the system at the beginning of a decoring operation and that some wet sand storage would be necessary in a system of this sort. It was impractical to store sand wet without removing the loose clay because it settled in layers, blocking orifices and making all operations unreliable. Attention was called forcibly to this fact by Mr. Sternberg of Continental Foundry & Machine Co. in experimental work done there in 1936.

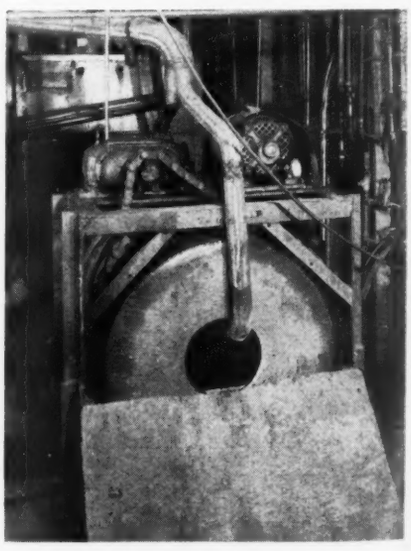
After removal of the clay in significant amounts by elutriation, most sand proved fairly clean. Extensive studies were made at American Steel Foundries (with Mr. Parker and Mr. Suttee), at Wright Aeronautical Co. (with Mr. Rose), and at the Cincinnati Milling Machine Co. (with Mr. Ewig and Mr. Schumacher) on the scrubbing effect on recirculating sand (70 per cent water and 30 per cent sand by weight) in an abrasive handling pump against an artificially induced head. Sand can be scrubbed effectively but expensively by that method. Many other methods were also investigated, all of which under certain conditions could be employed.

But the chief difficulty lay in the entire lack of agreement among foundrymen on criteria for cleanliness and usability. It was finally established fairly well that cleanliness could be measured by comparing the tensile strength of an oil-bonded baked specimen of reclaimed sand against a new washed sand from the same parent sand and of the same grain size and distribution. Other factors, such as loss on ignition and gas evolution, were interesting but generally of much less importance.

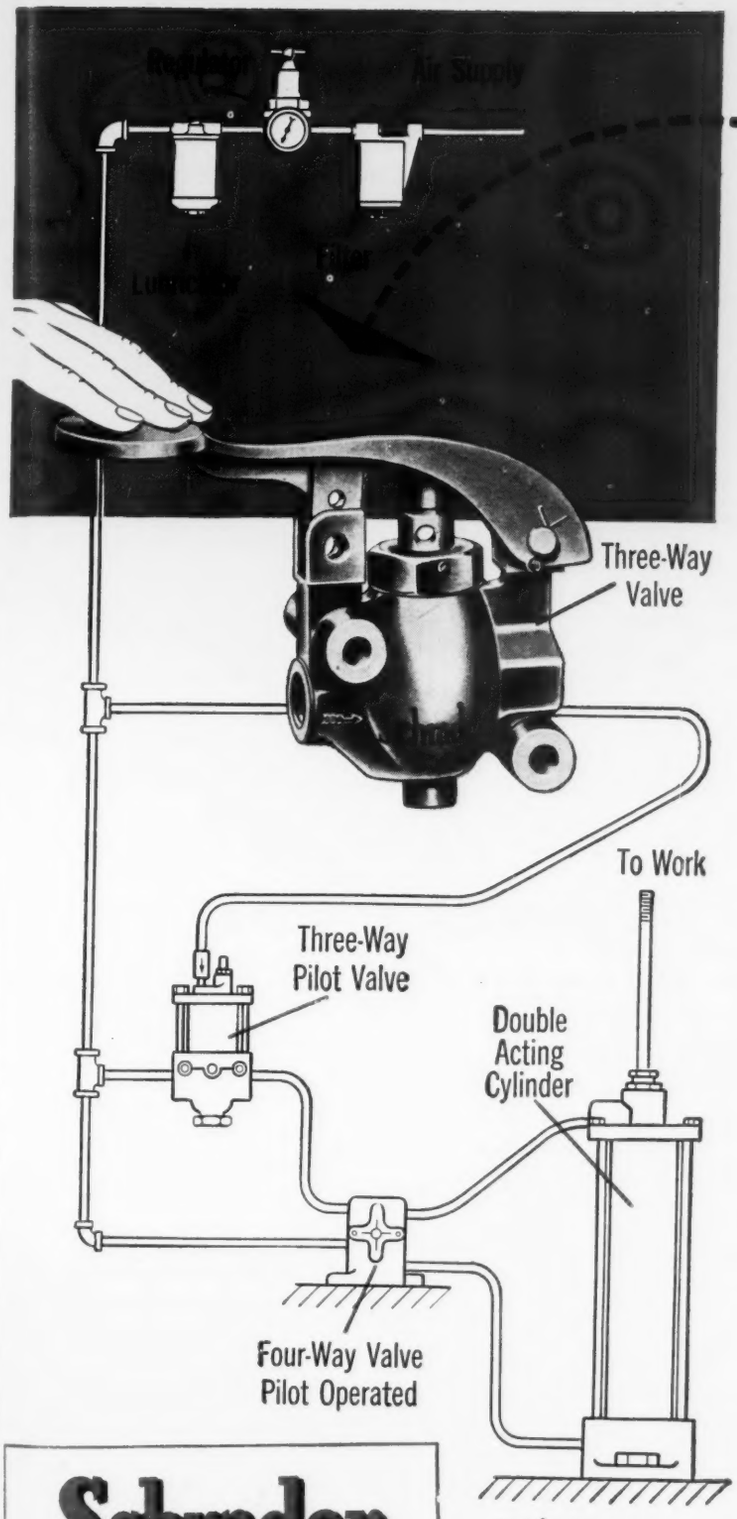
The laboratory equipment illustrated here was developed first about 1939 and has been changed fairly consistently as one after another of the methods of lumpbreaking, elutriation, scrubbing, dewatering and drying have been examined. As it now stands, the pilot plant has a continuous capacity of between 1 and 3 tons per hour.

In 1950 and 1951, approximately

(*Concluded on page* 240)



Sand goes through perforations in entrance to wet lumpbreaker. Oversize is screened out by vibration and sand pumped to classification



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Each Schrader Valve is individually tested to full pressure rating before it is shipped. That's why you're sure of reliable service from every valve that bears the Schrader name.

Whatever your production scheme, it's likely you use air as a tool. And wherever you use air, there's a chance to make its use more effective with valves you can count on—Schrader Valves.

To see how truly practical Schrader Valves are . . . how you can't help but benefit from their use, write, describing your compressed air requirements—or fill out the coupon below.

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View of Hydro-Blast sand laboratory shows some equipment and a view of the samples of sand reclaimed in the laboratory. The pilot equipment shown here can produce between 1 and 3 tons per hour of washed and dried sand and has been in almost constant use for the last 7 or 8 years

(*Concluded from page* 238)

1000 tons of refuse sand, representing samples from about 100 foundries, was processed in this equipment. Samples ran from 5 to 50 tons. Smaller lots give some significant data, but samples of 10 tons or larger are considered more satisfactory for the following reasons:

1. The sample is more likely to be representative.

2. The sand reclaimed from the sample is enough to run actual production tests in the foundry itself.

3. Sufficient sand permits throwing out the initial ton of output, insuring against contamination from a previous run and allowing for adjustment to approximate grain size.

4. The sample permits the engineering department to observe any characteristics of the sand or the bond which might affect equipment design.

The real measure of such tests, however, is the conviction a production sample carries with the foundryman. If he can make good castings in it by his usual methods, especially if laboratory tests confirm the characteristics, he feels safer in going ahead.

In spite of the enormous progress made in sand control and in theoretical and practical studies of grain size and distribution, there is considerable contention whenever sand and binders are discussed. Little progress could have been made without studies in measuring sand characteristics, without equipment to control the processing of sand and without the active and dynamic curiosity of foundrymen and foundry engineers.

Alabama Pipe Foundry

(*Concluded from page* 113)

length, withdrawing automatically at the end of the stroke. Finally the bell face is ground with a portable grinder, and material accumulated inside the pipe during the cleaning operations is blown out by a lance.

Next step in finishing is to apply a tar coating (Fig. 9). This is accomplished at a dip tank located just beyond the cleaning stations. At this point the pipe still has a temperature of about 300° F, and this retained heat facilitates application of the tar and its subsequent drying. The tank is completely hooded, and an exhaust prevents smoke and fumes from drifting through the building. A number of lengths of pipe are lowered simultaneously by a rack into the dip tank. Upon removal they are tipped from the horizontal to promote draining, and then are returned to rails leading to testing and inspection stations.

A bursting test is applied by a machine which imposes a hydraulic pressure of 500 psi. From there the pipe is rolled to the final inspection station (Fig. 10) where it is weighed and dispatched to a shipping stand outside the building (Fig. 11). The company's name and trademark are applied to the pipe by a simple method just before it reaches final inspection. Instead of manual application by brush and stencil, the pipe rolls over a flat rubber stamp incorporating the lettering. Aluminum paint is applied occasionally to the stamp and is transferred automatically to the pipe.

An overhead crane spans the area adjoining the loading dock. A railroad spur leads to the latter. In addition to handling the loading of cars, the crane also transfers mechanical-joint pipe to a small building across the track where holes for connecting bolts are drilled in the flange. Most of the pipe produced is the bell-end type. Pipe that is not destined for immediate loading is stored in the area bounded by the craneway. A rack suspended from the crane hook (Fig. 11) can pick up as many as six sections of pipe at one time and facilitates handling operations.

The plant operates a rather sizable maintenance machine shop, devoted principally to fabrication and maintenance of the metal molds and other parts of the casting machines. Another important department is a well equipped laboratory. Its facilities, part of which are shown in Figs. 12 and 13, are housed in a separate building and include modern equipment required in various types of chemical and physical analyses.

Book Review

The Science of Flames and Furnaces, by M. W. Thring, cloth, 416 pages, 6 x 9 in., published by John Wiley & Sons Inc., New York. Price $6.50.

Mr. Thring's purpose has been to help to increase furnace research so as to speed the day when, as he envisions it, the "furnace of the future will be a precision tool of the highest accuracy and reliability controlled by instruments as good as those in an aircraft and with every process within it as thoroughly studied as the circuit of a wireless set."

The book concerns only flame furnaces and does not attempt to cover problems relating more to the material being heated than to the furnace itself. Within the limitations he set for himself, Mr. Thring, who is head of the Physics Department of the British Iron and Steel Research Association, has done a thorough, careful job which he hopes will be of interest to academic scientists as well as to engineers in charge of the design and operation of furnaces. There are chapters on the function of a furnace, the thermodynamics of furnace heating, the liberation of heat by combustion, heat transfer, the aerodynamics of hot systems, the science of furnace construction and the application of the scientific method to furnaces.

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It's *100%* easy handling of heavy loads with the Trav-Lift! No out-of-reach spots, no traffic-jam delays, no rehandling . . . *this way!* Lift, transport, lower and stack materials *anywhere* within an entire bay area. It's all done through the air, all by just *one* man.

That's why, when requirements call for cranes, P&H Trav-Lifts are first choice for fast handling. In the Trav-Lift, you get a custom-made crane at "stock" prices . . . because P&H uses standard money-saving designs . . . because P&H builds the entire unit, electrical equipment included.

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TECHNICAL REPORTS—IBF CONFERENCE

Reports on technical papers and discussions presented at the 49th annual conference of the Institute of British Foundrymen are concluded here. For other reports see the September issue

By VINCENT DELPORT
European Manager
FOUNDRY

TWO subcommittee reports from the technical council of the institute were presented at the recent 49th annual conference of the Institute of British Foundrymen. One, entitled "Flow of Metal," was offered by Subcommittee T. S. 35. The stated purpose of this committee, of which E. M. Currie is chairman, was "To study the flow of metal into molds and record it by color cinematography or other suitable means." The committee presented a colored film which showed the flow patterns of metal entry through different types of ingates. The importance of this lies in the relationship of metal temperature gradients within the mold proper and the postulation therefrom of the correct and properly arranged solidification rates, which assist the achievement of progressive or directional solidification, minimization of casting strain and prevention of warping, distortion and, possibly, cracking after cooling.

Every attempt was made to conform to general foundry practices in choosing passage areas. Naturally the film could deal only with elementary ingate forms, but since the most complicated gating system is based entirely upon such simple forms, a skilled foundryman can understand that the successful manufacture of a casting is not a result of chance, but of applied thought and sound reasoning.

The film showed nine series of flow patterns of metal with different simple molds, ingates, and conditions of pouring. Following the very interesting film, several questions relative to runners and ingates on the examples shown were put to the chairman of the committee. A. E. Peace, chairman of the Technical Council, said the film had amplified the effect of the velocity head, which seemed to be of paramount importance to an understanding of what was going to happen with various ingates and of their position in relation to the runner bar. P. A. Russell said the film brought out the major fact that the stream of metal proceeding at speed in one direction would continue in it. Mr. Currie, replying to the discussion, made the point that after nearly 30 years of foundry experience he realized that there are many ways to run a casting, many of them good, but that there was not one "best way." The best method depends on circumstance, the size of the job and its design.

The second report was from Subcommittee T. S. 32, of which M. Hallett is chairman. Its objective was "To investigate the problems of internal stress in castings." The committee stated that since the conclusions of its report are based on studies of only a small number of castings, they are purely tentative. These conclusions may well be modified by future work on larger castings of different shape. The conclusions are summarized as follows: (1) Temperature differences are an important cause of internal stresses in castings; (2) when internal stresses in a casting are balanced by compression of the mold at the moment of stripping, they disappear when the sand is removed from the casting; it must be remembered that where the rigidity of the mold has caused plastic deformation of the casting, permanent stresses may result; (3) stresses caused by temperature gradients in simple castings may be of a magnitude approaching the yield strength of the casting; (4) residual internal stresses can exist only at relatively low temperatures—that is, at temperatures lower than that at which rapid creep under the stress concerned will occur.

Opening the discussion, D. C. G. Lees said the committee had defined internal stresses as being those "which remain in a casting after it has been removed from the mold," and he went on to remark that they "arise during casting and subsequent cooling." It was noted that restraint of contraction caused by the pressure of sand led to hot tearing, distortion and other defects, and that temperature differences within the casting might lead to cold cracking. Thus the internal stresses might be eliminated, but at the cost of the integrity of the casting.

Referring to work on aluminum alloy castings, he said that the grain size of the metal had a marked effect on the tendency of cast aluminum alloys to show hot tears when contraction was restrained. It is a well known fact that fine grained materials have a lower resistance to creep at high temperature; consequently one can readily understand that they are less prone to hot tearing, and one might think it possible that any internal stresses in them would be smaller than in coarse grained castings. As he discussed further advantages of fine grain size, Mr. Lees wondered to what extent his remarks would apply to other metals than aluminum alloys. He also suggested that pouring temperature effects might be further studied.

Mr. Hallett replied that Mr. Lees was quite right in pointing out that the fine grain alloys might be less prone to internal stresses than coarse grain alloys. In the report the committee had admittedly dealt only with the conditions giving rise to internal stresses. It had not yet considered steps that could be taken to overcome the effect of internal stresses. Agreeing that a great deal of further work was needed on the effect of pouring temperature, he emphasized again that the conclusions of the report are preliminary.

Locate Casting Stresses

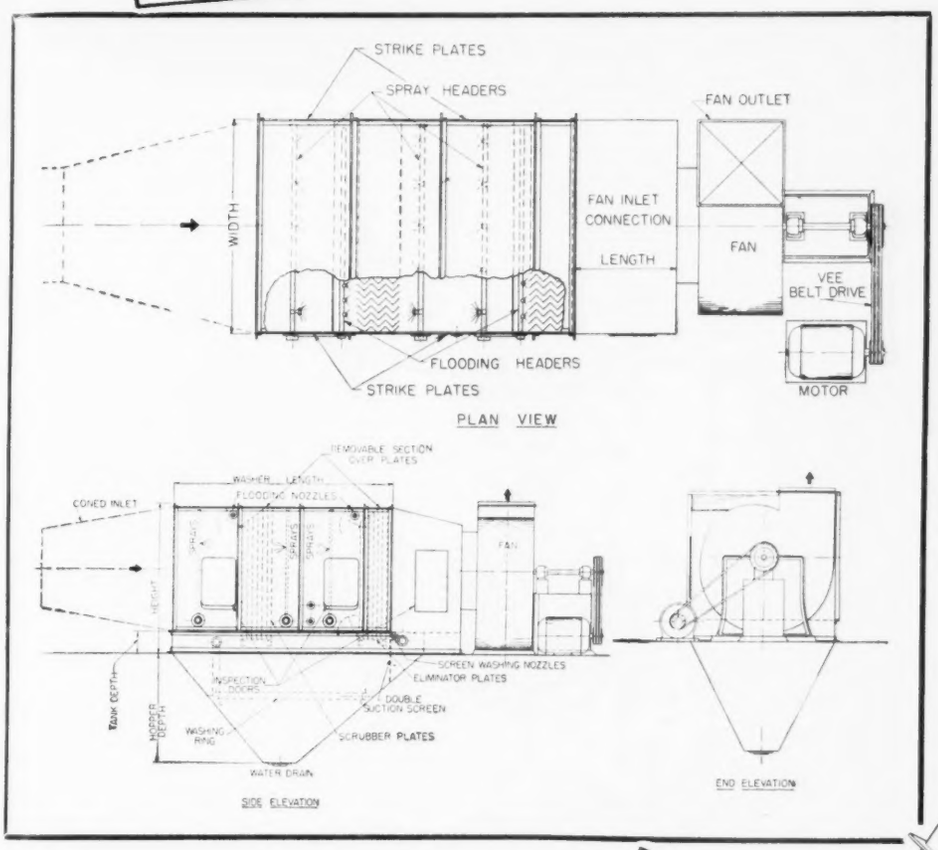
T. R. Twigger, chairman of the Subcommittee on Heat Treatment of Gray Cast Iron, remarked that as a result of the report it was possible to begin to assess the magnitude and location of casting stresses. Foundrymen must learn how to avoid such stresses or how to remove them by heat treatment. He pointed out the interesting fact that whereas it was generally thought that the majority of residual stresses could be removed by low temperature heat treatment, the report said that residual stresses could be caused only at low temperatures.

J. Dearden asked whether it was better to allow a casting to cool down in the furnaces or in the air. It had been shown that it was better to knock out the casting while it was still hot and let it cool in the air, but that procedure induced a little residual stress. Did the same apply, he asked, to cooling after stress relieving by annealing. He suggested that there are two questions involved. One is whether the last portion of a casting to cool always finishes up in tension. The other is whether the presence of distortion in a casting which had cooled down is proof that there is some residual stress in it. He noted that the absence of distortion in a casting is not necessarily proof that there has been no residual stress.

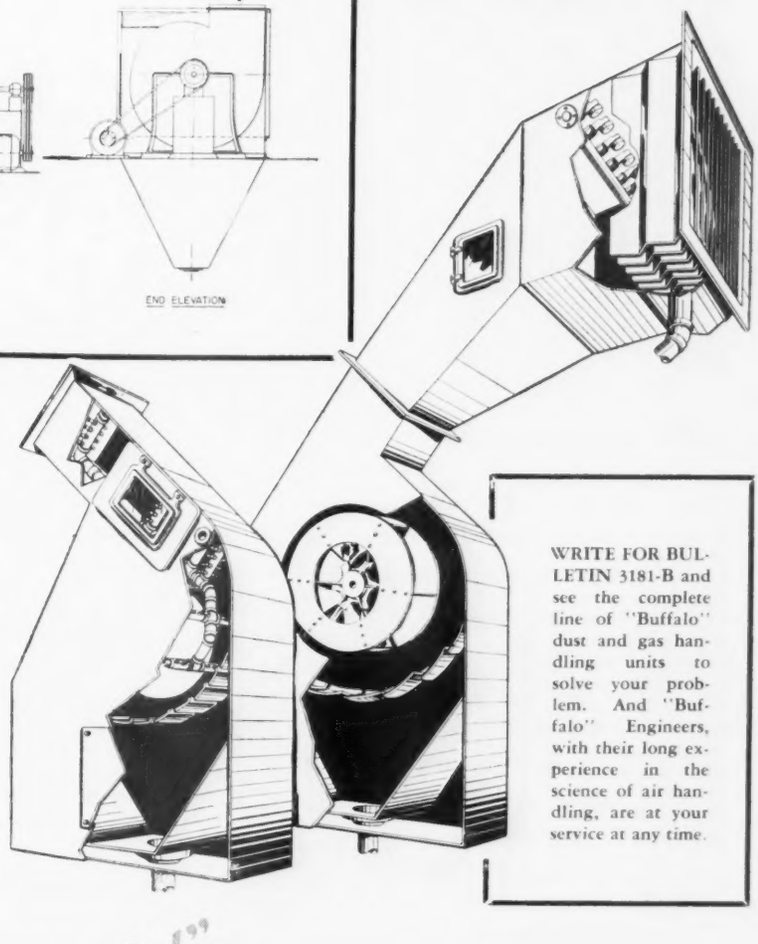
(Continued on page 244)

"Buffalo"

Tips on DUST ELIMINATION



WET-DUST ARRESTORS for LOW-COST OPERATION



Low-resistance "Buffalo" Type DC Static Air Washer does a thorough air cleaning job by passing air through three main banks of sprays, a set of scrubber plates and a set of eliminator plates. There is no free moisture carry-over. Dust collects in hopper for easy removal. Regular cleaning maintenance is simple, since plates are under constant spray. Arrangement shown above is for dust loadings up to 8 grains per cubic foot, though units for heavier loadings may be had.

Every dust elimination problem is different, and demands specialized equipment. "Buffalo" builds 8 types of units, each in a variety of sizes and arrangements, to handle any dust load. At right is the "Buffalo" Hydro-Volute Scrubber, a compact fan-and-washer unit for removal of various dusts. Water is recirculated at low pressure. Water consumption is therefore very low.

WRITE FOR BULLETIN 3181-B and see the complete line of "Buffalo" dust and gas handling units to solve your problem. And "Buffalo" Engineers, with their long experience in the science of air handling, are at your service at any time.

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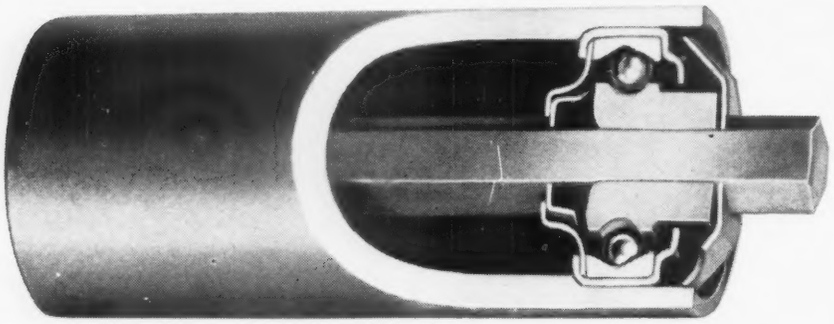
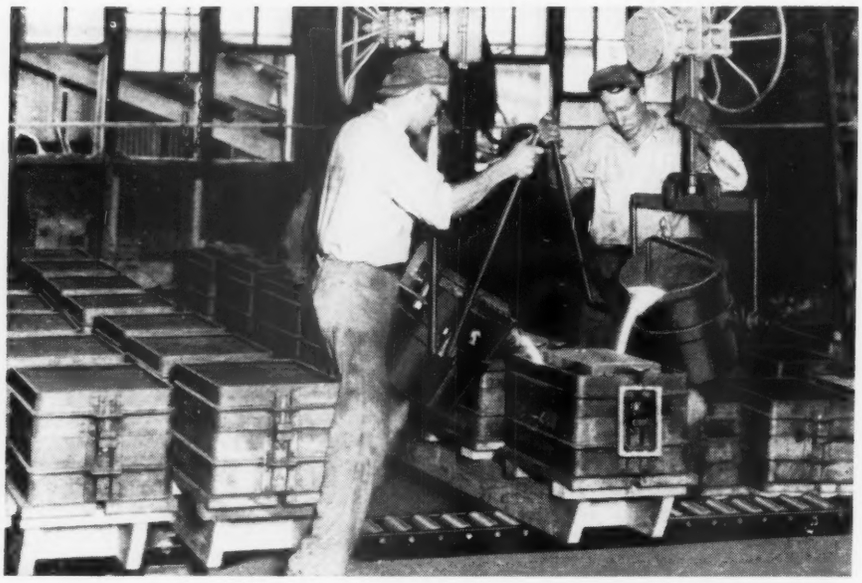
Are Expressly Designed for Foundry Conveyor Service





Every Standard roller conveyor is equipped with specially designed bearings that provide the maximum of protection and durability in foundry service. Spillage of hot iron is guarded against by special steel shields. These convex shaped shields fit into the ends of rollers to repel foreign matter. An exit for small particles is provided by an opening at bottom of shield.

Foundry conveyors are designed and built in their entirety by Standard—in a wide range of sizes, weights and types. You can depend on Standard for the right conveyor for your needs — we have been designing and building foundry conveyors since 1906.

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Engineered Conveyor Systems • Portable Conveyor Units • Spiral Chutes • Pneumatic Tube Systems

Send for Standard's special catalog "Conveyors for Foundries" — a valuable reference book illustrating and describing conveyor installations in leading foundries.

ENGINEERED FOR LOW-COST PRODUCTION

(*Continued from page* 242)

since failure of a casting to distort might mean only that the residual stress was still high.

In his reply Mr. Hallett said that in the case of a stress relieving operation carried out as a result of heating in a furnace, he was sure cooling in the furnace would produce less stress because the whole of the part being cooled would get to much the same temperature. If one pulled the casting out and allowed it to cool in the air, however, the thin parts would cool more quickly than the thick ones, and the temperature differences would cause internal stresses. He pointed out that stresses occur in three directions and that a tensile strength in one direction might not correspond to one or both in the others. He said that distortion is certainly one of the manifestations of internal stresses and usually arises from internal stresses or stresses which have been at a relatively high temperature. He agreed that the absence of distortion is not proof that internal or residual stresses are absent.

Iron May Be Damaged

Mr. Grant said that it is not strictly true that there are no internal stresses at high temperatures. He also pointed out that when strain comes near to causing failure, some damage is done to the cast iron; when the casting reaches room temperature, there may be no residual stress, but the iron may have been damaged. Mr. Hallett replied that there is no doubt that the report did not make it sufficiently clear that the stresses which are imposed while the casting is cooling at a high temperature may affect the amount of internal stress present when the casting has cooled. He said that so little is known about damage suffered by iron that at this point there is little to go on.

Mr. Colton referred to cases when cracks developed some time after castings apparently had been made satisfactorily. Mr. Hallett replied that the only explanation that can be given at the moment is that some small temperature condition had been superimposed on an already highly stressed casting and put it just over the edge of endurance.

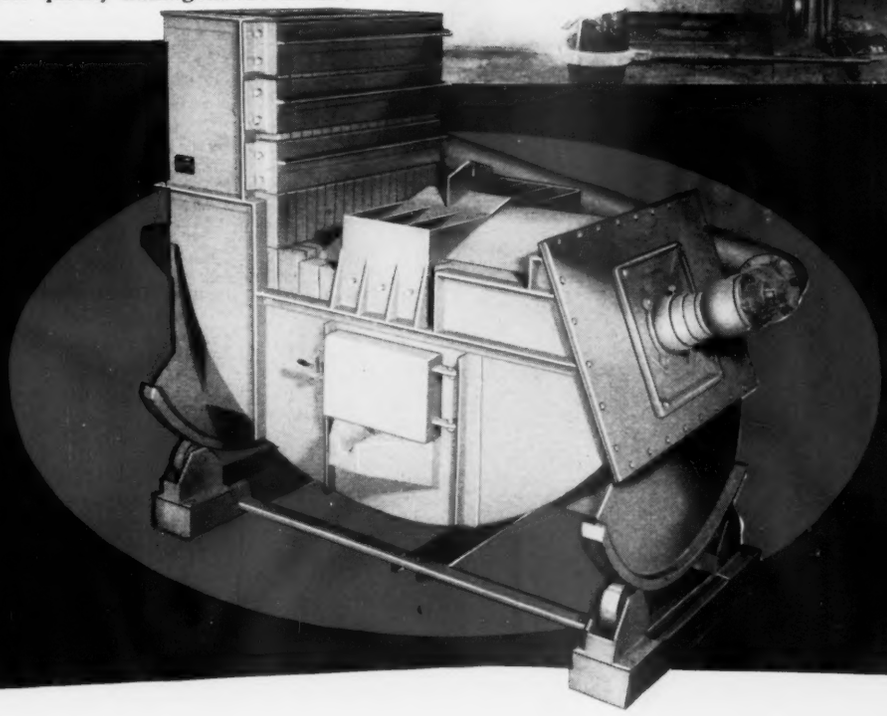
In the steel section, J. J. Dewez, works manager, Usines Emile Henricot, Belgium, presented the official exchange paper from the Association Technique de Fonderie de Belgique. His subject was "Manufacture of High Quality Steel Castings at an Economical Price." He discussed the following points in relation to the manufacture of steel castings: (1)

(*Continued on page* 246)

MELTS...AS IT PREHEATS...AS IT CHARGES...AS IT POURS

NEW Eclipse Reverberatory Furnace

Melts Brass, Iron and Aluminum
Offers production and metallurgical advantages never before obtainable in metal melting. Melts and preheats simultaneously. Speeds melting periods. Near-perfect combustion and controlled uniformity of bath produce highest quality homogeneous metals.



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(*Continued from page* 244)

Co-operation between drawing office, engineer and foundrymen at the design stage; (2) question of quality of articles produced—namely, internal and external soundness, composition and heat treatment of the steel dimensions, shape and machining allowances; (3) control of every operation during and after manufacture from the methods department to the final checking; (4) question of the cost of all operations; and (5) human aspects of question in relation to the quality of the men employed.

Questioned as to whether annealing should take place before or after a casting is cleaned, Mr. Dewez said that in his foundry a rough machining is done first, to see if any defects appear. He mentioned that during his visits to the United States, he had noticed that the heat treatment appears to be done first. He thought that for pieces cast of special steels, the best sequence is normalizing treatment, rough machining, and the final heat treatment. Mr. Hall referred to the author's statement that faulty castings that could have been reclaimed were scrapped and said that he thought the procedure was a good one. Mr. Dewez replied that his foundry attached considerable importance to the quality of castings and that the scrapping of faulty castings, even though they could be mended, discouraged slackness and inattention and helped to obtain consistently good quality.

Note Progressive Spirit

F. Cousans, Hadfield Ltd., Sheffield, presented a paper entitled "Probable Trends in British Steel Foundry Practice" in which he noted that since the frank exchange of ideas and information by steel founders during the war, the visit of the productivity team to the United States, and productivity conventions organized by the British Steel Founders' Association, a really progressive spirit has developed in the industry.

The author stated that when a supply of good scrap becomes available, some foundries will change over from the basic to the acid electric process and that extensive use of the oxygen lance will be made. In regard to sand practice he stated that there has been a steady changeover in recent years from the use of naturally bonded sands to the use of synthetic sands. That trend, he predicted, is likely to continue, and the use of finer sands than are at present used in Britain also can be foreseen. More mechanical aids will be provided for the molding shop. He saw increases

(*Continued on page* 248)

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(*Continued from page* 246)

in the use of light alloy patterns, of core blowing machines in the jobbing foundry and of dielectric drying of plastic bonded cores.

Other points included a bright future for the use of the shell molding process, increased use of modern methods of cleaning castings and progress in the use of mechanical handling equipment. The author also mentioned the possibilities of production control, training schemes, and good housekeeping, all of which are already making progress. Dealing with foundry methods, Mr. Cousans mentioned problem developments in regard to heading and gating methods, the use of gamma and x-ray investigation, the use of exothermic feeding materials and many other details.

W. C. Meredith and F. Cousans, Hadfields Ltd., Sheffield, collaborated on a paper entitled "Production of Manganese-Steel Castings." They first gave a brief history of manganese steel, including accounts of Sir Robert Hadfield's experiments, early production methods and typical designs of castings. This was followed by a description of present day foundry methods for making manganese steel castings which covered molding materials and washes, feeding heads, pouring, knocking-out and quenching. The account concluded with mold layouts of numerous examples of important types of castings.

Describe New Plant

The fourth paper dealing with steel was "Recent Experience with Basic and Acid Electric Steel" by L. W. Sanders, Lake & Elliot Ltd., Braintree, Essex. The paper described the changeover from a small, basic lined electric furnace, run in conjunction with a converter, to balanced production from modern basic and acid lined electric furnaces. Particulars of the new plant were given, with details about the linings, the melting processes and the degree of uniformity obtained.

The authors concluded that the changeover has resulted in a more even flow of materials through the shop and a quicker turnround of flasks. Moreover, the same quantity of steel is produced by reduced manpower in the same overall time. They felt that if timing and procedure are controlled, making acid steel for foundry use presents no metallurgical difficulties. Providing that close control of scrap is maintained, it is possible to produce acid electric steel with physical properties similar or only slightly inferior to basic electric steel.

"Sand-Cast Beryllium Bronze," the exchange paper from the Association Technique de Fonderie, Paris, was delivered by L. Grank of the Services de Recherche et Essais Physiques de Chambery, Chamberie, Savoie, France. The paper described the composition of beryllium bronze, discussed the question of oxidation in contact with air during melting and casting and reviewed the mechanical properties. The author stated that beryllium bronze provides a link between the properties of the bronzes and steel. It pours and casts particularly well; it can be made very hard after quenching, and easily machineable (as either cast or annealed) and has high mechanical strength. Certain properties of this alloy encourage its use in electrical construction, mechanical engineering, plastics manufacture, mines, petroleum refineries and explosives factories.

The paper dealing with light alloys was "Gas Removal from Molten Aluminum Alloys" by A. W. Brace, assistant metallurgist, Aluminum Development Association. The paper reviewed work that has been carried out on the problem of removing dissolved gases, mainly hydrogen, from molten aluminum alloys. This was followed by a survey of the mechanism of gas absorption and removal, including sources of hydrogen, factors affecting the amount of porosity and its distribution, and conditions for the removal of gas from the melt. Consideration was then given to the application of this knowledge for the production of castings under normal foundry conditions.

An investigation made by the author and his colleagues under production conditions was described. It dealt with the effect of chlorine and volatile chlorides on the soundness of castings. It was found that application of more than an optimum amount of chlorine resulted in the appearance of shrinkage cavities in the castings. On the basis of these findings, a system of control was instituted which resulted in a reduction of casting scrap from all causes from 7.2 to 4.8 per cent.

In a paper on "Grain Refinement of Nonferrous Castings," G. Swinyard, J. Stone & Co. (Charlton) Ltd., remarked that although much work has been done on magnesium and aluminum alloys, grain refinement has not been studied to the same extent with relation to copper base alloys. He reviewed briefly the position in regard to the two light metal alloys, went on to a discussion relative to copper alloys and referred to original work done on gunmetal. He believes that finer grain size in bronzes may result in higher mechanical properties and sounder castings. Many castings, he stated, are scrapped because of defects associated with coarse grain.

Study Dust Problem

G. M. Michie, senior technical officer, Research and Development division, British Steel Founders' Association, and G. H. Jowett, Department of Mathematics, University of Sheffield, contributed a paper on "Research on Atmospheric Dust in Steel Foundries, with Special Reference to the Use of Statistical Surveys." The comprehensive program of research being conducted by the steel-founding industry toward the removal of dust in its various processes was outlined, and the importance to the problem of both medical and environmental surveys and the statistical nature of each were emphasized.

Before the authors proceeded to discuss at length the use and interpretation of atmospheric dust surveys, they referred to dust sampling and estimation and the potential importance of automatic methods. For purposes of illustration, two environmental dust surveys in steel foundries, the data from which were subjected to detailed statistical analysis, were then discussed. The results show the influence on dust level of such factors as the local operational process, the day of the week and the time of the day.

Dr. V. Atterton, Department of Metallurgy, University of Cambridge, presented a paper entitled "Thermal Expansion and Contraction of Compacted Steel-Founding Sands and Mold Washes." Sponsored by the Research and Development division of the British Steel Founders' Association, the paper dealt with investigations made on the length changes that occur during the heating and cooling of small, dried compacts of

(*Concluded on page* 250)

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Contains an *Atlas* section defining the concentration of foundry capacity, production, and employment in 96 marketing areas. Has *State* section devoted to analysis of foundry capacity and employment in each of the United States and Provinces of Canada. Includes *comprehensive list* of Foundry Supply Houses and Agents. An outline Foundry Market Area map facilitates user-analysis of own sales potentials.

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"Sizing Up The Foundry Market" presents new facts about this market, its growth, its future and its coverage by FOUNDRY. Complete information on circulation, readership, editorial, and mechanical details. A must for every media file.

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A geographical listing of all foundries giving names, addresses, metals melted, melting equipment used, and departments operated. It lists every one of the more than 5,000 foundries in the U.S.A. and Canada. Cost, $75.00.

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(*Concluded from page* 248)

various molding materials. For simple bentonite bonded molding sands, the expansion up to about 1000°C increases in the order of zircon, olivine, silica. The expansions of zircon and olivine sands are regular in contrast to the irregular expansion of silica sand. The expansion of loosely rammed, low density compacts of bentonite-bonded silica sand is small. Expansion rises rapidly as the density is increased, then falls quickly to a low value and further decreases slightly with further increase of density. Increase of binder content and of moisture content in the 'green' state both lead to a decrease in compact expansion.

The theory proposed to explain these variations suggests that the expansion is controlled by the thickness of the clay bond between the sand grains, the presence of closed pores (that can be inflated by gaseous pressure) in the clay bond and the strength of the clay bond. This theory takes into consideration experimental results on the expansion characteristics of the bentonite bond and of the strength of the bond between the sand grains. Observed variations of compact expansion with sand grain size merely reflect resultant variations in compact strength.

No evidence for any influences of woodflour or of organic binders on the expansion characteristics of silica sands has been found. The difference of expansion between a silica wash and a silica sand was shown to produce cracks in the wash. This effect is considerably accentuated when a silica sand is coated with a zircon wash. Casting defects caused by volume instability in the mold material were discussed in the light of the results, which suggest that differential expansion between the facing sand and underlying sand is the prime cause of scabs.

R. J. Hart, chief inspector, Lake & Elliot Ltd., Braintree, Essex, contributed a paper on "Gamma Radiography in the Foundry." The paper dealt with the use of radio isotopes for nondestructive testing of castings. In his conclusions, the author emphasized the outstanding possibilities of the use of isotopes and foresaw the time when destructive testing may be eliminated. He stated that although training is necessary, no highly scientific background is required of the industrial radiographer. Gamma radiography serves a twofold purpose because it affords the foundryman an opportunity to observe and improve his foundry technique and has a distinct advantage to the purchaser in that valuable machining time is saved.

NEW Cedarapids Built by IOWA Schrock Motorized HEAD PULLEYS

SIMPLIFY EVERY BELT CONVEYOR AND BELT-BUCKET ELEVATOR INSTALLATION

IT'S COMPLETELY DIFFERENT FROM CONVENTIONAL CONVEYOR DRIVES

Everything is contained **INSIDE** the pulley!

ELIMINATES ALL MAINTENANCE ON SPROCKETS, CHAINS, JACK-SHAFTS, V-BELTS, ETC.

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WHAT A *Motorized* HEAD PULLEY IS

THIS is a revolutionary departure from the conventional types of conveyor drives. A *motorized* head pulley is a fabricated steel pulley with *everything*... electric motor, reduction gears and all moving parts . . . contained inside the drum! It's simply a new application of the long-proven gear reduction drive, and because of its simplicity, it's the answer to the maintenance man's prayer. 70% to 90% of conveyor down time is saved by eliminating all countershafts, speed reducers, sprockets, chains, Universal shaft drive and other parts necessary with conventional pulley drives. Motorized Head Pulleys are simple to install and flexible in use, completely interchangeable and adaptable to all types of belt and belt-bucket conveyor installations. By means of a simple adapter, a single pulley can be utilized in any of several belt locations, operating various widths of belt, or changing from larger or smaller horsepower. Pulley sizes range from 5 to 30 HP and are available in various widths. A Motorized Head Pulley is safe, because there are no sprockets, chains, jack-shafts, V-belts, etc. to endanger personnel. It's compact... requires no more room than a conventional pulley. Complete protection from weather, grit and dirt also reduces maintenance. Cedarapids Schrock Motorized Head Pulleys have been job-tested for many years under severest working conditions.

HOW IT WORKS

The pulley shell rotates about the electric motor, which is held stationary by means of a torque arm attached to the conveyor frame. The speed of the shell depends upon the combined reduction ratio of the various pinions and gears contained within the pulley shell. This reduction starts with a primary pinion mounted on the motor shaft and ends in the ring gear attached to the shell. The shell in turn then drives the conveyor belt. Leads to the motor enter the head pulley through a hollow conduit passing through the drum end bell and bearing. A simple oil bath gear compartment provides a lubricating bath for the reduction gears and front motor bearing. Motor and head pulley are cooled and ventilated by holes in the drum.

GET COMPLETE DETAILS TODAY

Find out all the advantages of converting your conveyor installations to motorized efficiency before you need head pulley replacements. One internationally known company has 50 Motorized Head Pulleys installed on widespread conveyor operations, and plans more for every installation that requires replacement. Get complete details about every feature. See your distributor today, or write direct to Iowa Manufacturing Company.

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Pulley & Sprocket Dept., Benicia, California

Adventures of BILL

By PAT DWYER

Illustrations by RICHEY

LISTEN my lad," Bill said the other night while he gracefully spread himself over two chairs on the veranda and pulled a two or three page letter out of his pocket, "Listen, me boy, while I read you a real foundry story I had the good fortune to receive in the mail a few days ago."

"You can stick the story back in your pocket or in the rubbish can conveniently at your elbow," I told him wearily. "I have heard and read millions of 'em and even tried my hand at writing a few now and again. They are all alike. The vein has been worked out."

"That's the narrow professional viewpoint. The stories with which you are familiar have been written by men on the inside. Naturally they bear a certain resemblance to each other. This one which I now hold between the thumb and index finger of my right hand, was written by an outsider, an out and out outsider, and illustrates, or perhaps I should say confirms, certain lines from the pen of the late R. Burns: 'Oh! wad some power the gifties gie us to see oorsel's as ithers see us!' This story was written by a lady, a stranger to me. Therefore don't ask me for any details of age, weight, height or physical dimensions. She sent me the story with a request that I submit it for publication in FOUNDRY.

"According to my limited familiarity with the subject, the principal essentials for success in the journalistic field are an observing eye and ear, a nice sense of perspective, a wide background of general knowledge and a photographic memory to receive and retain a mental impression of all that is said, done and presented at any given time and place, or under any set of circumstances. With true feminine inconsistency the lady ignored all the beacon lights, all the traffic signals and road maps, and just followed her own sweet fancy in writing the story. What are all these trifling sign posts? Like the dew on the mountain, like the foam on the river, like the bubble on the fountain, they are gone and forever.

"Any person can describe these things. Your true artist is not troubled with prosaic details. He or she gives you personal impressions and that, my dear, is a highly important feature. If the finished job is over your head, if it resembles nothing in the heavens above, the earth beneath or the waters under the earth, why, that is your hard luck. It just proves how dumb you are. This author is a real artist. Listen my son and you shall learn how castings are made from stem to stern. You'll be surprised!"

"All right," I said. "Have it your own way. I shall stipulate only one thing. If the thing is written in verse—any kind of verse, particularly blank verse—I shall not be responsible for what may happen to you. I am a patient and long suffering individual, but I must draw the line some place. If there is one place more than another where the line should be drawn it is in the field of amateur poetry. Go ahead. Shoot!"

"Brace yourself. Here she comes!"

Foundryman Performs Modern Miracle

By Dollie Varden

Revolution in foundry business has been bared here. New molding system developed by P.I.O'Nearing produces "Bushing Stock" on the spot. Ordinarily men work hard to create forms in wet sand. Then the molten metal is poured into the forms, the sand knocked away, and the new plate removed. They call the newly created bearing "Bushing Stock."

"Fast work," Bill commented. "First its a plate, then its a bearing, therefore they—whoever they are—call it bushing stock. It would be interesting to know what the old-time gaffer called the lads who poured molten metal into wet sand molds. I am afraid the best mark I can bestow in this instance is a small lower case p."

This stock then is put on a lathe, trimmed to exact measurement and inserted into the hub of the wheel, so that the bronze, brass or aluminum, not the steel of the big wheel, turns on the axle. The metals used as bearings are called "frictionless."

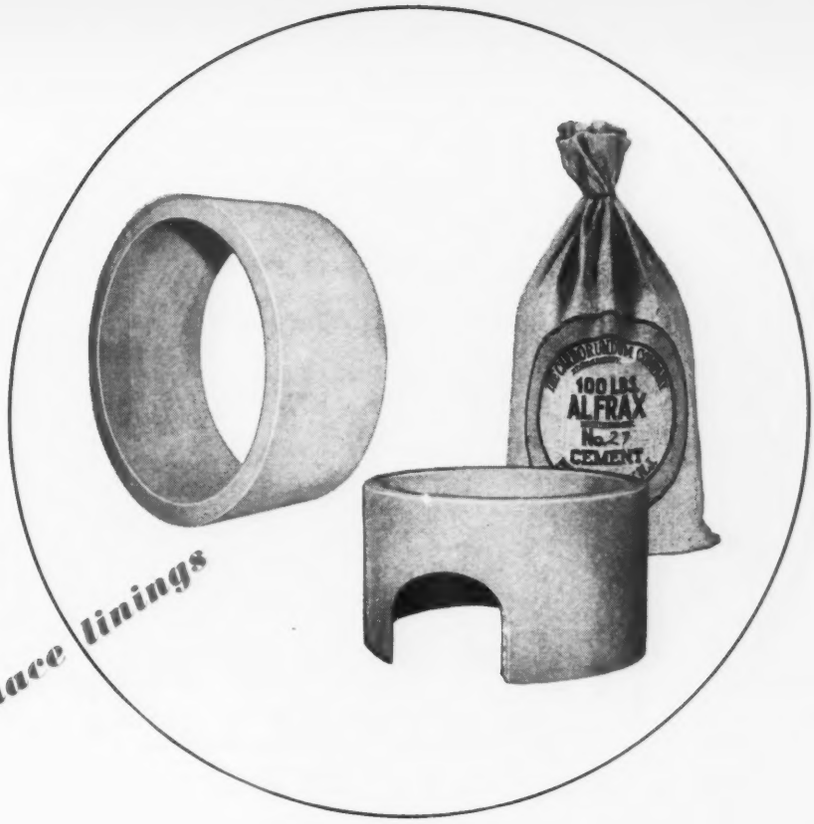
"Far be it from me to throw a sprag in the wheel but it seems to me I have seen wheels here and there where wheel and axle, or shaft, turned as a unit. Also I have seen wheels of other metal than steel. I'll mark the item I. I for imagination."

"Go easy on the marks," I warned Bill. "We have a long way to go. As the boys say, 'Y'ain't seen nothin' yet.'"

O'Nearing has been in the foundry and machine shop business for the last nine years. He has applied for patents on a mold that weighs 16 pounds or less, not 160, that will cast

(*Continued on page* 254)

Work is just like play for the sturdy boys and pretty girls



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a ring/cement lining with 4 big advantages

Here's a lining for non-ferrous melting furnaces worth knowing about. It consists of one-piece CARBOFRAX silicon carbide rings, 1½" thick, backed up with 2½" or more of ALFRAX aluminum oxide insulating cement. Operators write that it . . .

GOES IN FASTER. Rings are light enough for one man to handle. No hoist is needed. The cement is handled like Portland cement — just mix with water and pour. A full lining can be installed in a couple of hours over a week-end, and be ready to go Monday.

STAYS IN SHAPE LONGER. CARBOFRAX rings make one of the most durable linings known. They are inherently resistant to flame erosion, spalling and cracking, and will go many months with little or no patching. Even really high temperatures won't soften them.

CUTS FUEL COSTS. Since the rings are only 1½" thick, there's ample space left for insulation. Moreover, the ALFRAX cement that backs up the rings is one of the best refractory insulating materials available. It provides a low heat capacity furnace and keeps heat loss to a minimum — hence less fuel is needed to turn out more melts.

GIVES EXTRA HEATS. You'll get fast, uniform heating with these linings, and *consistent* time per heat. One extra heat per day, sometimes two, is quite possible.

Why not check up? It takes just a moment to drop us a line. We'll gladly furnish recommendations to fit your needs. We make lining materials — rings, ring segments, and cements — to fit *every* need. Address Dept. A-102, Refractories Division, The Carborundum Co., Perth Amboy, N. J.

Use furnace linings by

CARBORUNDUM

Trade Mark

for lower cost installation . . . operation . . . maintenance

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(*Continued from page* 252)

a bushing stock which needs no preliminary blasting with sand to clean it. He can produce within 15 minutes almost any bushing up to 8 inches in outside diameter with any size inside, and he does not have a bushing stock.

He is using the old idea of "Hard Cores," the method of making a sand form, then baking it hard, for his outside shells. He built a machine that takes any size of pattern for this and builds the sand mold into a metal shell. The molds, not the bushings, are kept in stock.

Then he designed a means of inserting different sized ends in the same mold; and of clamping the mold together at the ends so that it will withstand the heat and pressure of 2300 degree metal.

"Here is where the gifted authoress introduces the slightly human interest and romantic angle." Evidently Bill had read the effusion carefully. "Without doubt the old idea of hard cores was associated in the feminine mind with the approved and ancient formula for the bride's costume: 'Something old, something new, something borrowed and something blue.' Old cores, new idea, borrowed quotation marks and blue Monday."

"If it is all the same to you, Bill," I said, "I respectfully move you postpone reading the remainder until I feel a little stronger. Enough is enough for one day."

"Better take it all in one dose m'lad. I'm harboring a gentle suspicion that if you quit now, you never will come back. Did I ever tell you of an old doctor who pulled me out of the jaws, etc., by spilling into me three times a day a horrible mixture composed of equal parts of gall and wormwood, sulphuric acid, formaldehyde and sheep dip. He was a great believer in the old foundry technique of pouring everything fast and hot. As you were. I'll spill the remainder in a jiff, or possibly two jiffs—if you know what a jiffy is."

Learning the highly skilled trade of molding, which usually takes five years, is reduced to two weeks. A woman can do it. She can lift the 16 pounds or less with ease. And he's never had a case of sand leaking into the metal since he started.

"And what do you think of that? Never had a case of sand leaking into the metal since he started. The lucky dog. Ever since I can remember, and away before that time, the Molder's Union and the majority of foundry owners stubbornly have insisted on a four-year training or apprenticeship period. Won't their faces and the faces of all old-time foundrymen be red when they learn that a two-week period is all that is required to learn the trade? A woman can do it! Next thing I suppose foundry recruits will be nipped out of the kindergarten."

"Could be," I admitted. "The skill of a two-week foundry trainee at least would equal that of a writer without training or experience of any kind. However, that's neither here nor there as the boy said when the old man asked him to show where he put the chaplet on the pipe core. Any more weeds in the present literary garden?"

The whole equipment is built of "Junk" metal from the war surplus yards. He's using scrap metal for bushings, and he figures that with $800 worth of molds on hand, including equipment and labor, he has about the same ability to provide quick service for industry as a man with $55,000 worth of bushings.

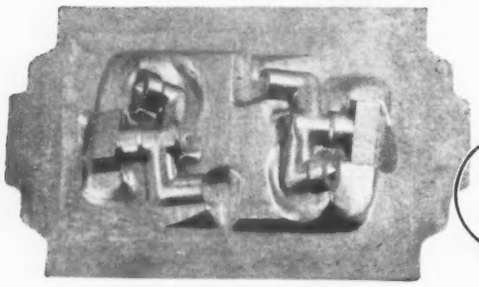
Now that the mold is perfected O'Nearing is "reversing the entire business" in a mass production system he's building in his shop. He will take the molds to the furnace, just tip the metal into them (with the metal always the same temperature) instead of lifting a big pot of the stuff and hauling it all over the room producing smoke, grime and sweat. He already has licensed one operator to use his mold. He thinks

MORE CASTINGS AT LESS COST

with PRESSURE-CAST ALUMINUM

MATCHPLATES and COPE & DRAG PLATES

We make single- or multiple-pattern cope & drag plates from one master pattern.



Multiple casting matchplate (left) from pattern (below).

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"its going to take hold all over the country pretty fast." The system he worked out, he believes, is capable of being used for almost any kind of sand molding.

"And how," I inquired politely, "did you get off the horns of the dilemma. In your reply what did you beg to state?"

"Very difficult job to tell the truth and still not hurt the feelings of the party of the second part. Listen:

"As an old-time molder I have read many articles dealing with foundry practice. In all sincerity I can say I never have read anything to compare with your recent effort dealing with a revolutionary method developed by P.I.O'Nearing for producing bushing stock. The article contains more generality words and less pertinent foundry information than anything in my experience. I have read it over several times and all I can say is 'I give up!'

"In a foggy kind of way I gather the general impression that Mr. O'Nearing rams a core sand lining in a metal shell or container to form the outside wall of the casting. These containers are handled individually instead of in the usual foundry method where two or more bushings are molded in a single flask. Nothing extraordinary in that. Castings have been poured by the centrifugal method into sand-lined metal molds for many years.

"Now, now, now! Please count ten and read the rest of this bit of friendly and constructive criticism, before you throw your hat on the floor, jump on it with both feet and call down many bitter curses on this old gray head. Your story might find acceptance in a newspaper, where news is important, but where technical accuracy and detail are not considered necessary.

"FOUNDRY readers are familiar with castings known as bushings. No need to use quotation marks. They also are familiar with the use of these castings. No need to tell them. In the usual foundry method these casting are *not* made in *wet* sand molds. The statement that Mr. O'Nearing can produce any bushing up to 8-in. diam in 15 minutes is open to doubt. How about the time required to bake the mold and melt the metal? No mention is made of how the center core is held in place, or of the gating method for introducing the metal into the mold. Foundrymen have more than a passing interest in these features. The broad statement that a five-year molding apprenticeship can be compressed into two weeks is—shall we say—debatable!

"I don't think Mr. O'Nearing would

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Never before a glove so equally resistant to abrasion, cutting, heat, oil and core-binder chemicals, and with such flexibility and grip. Fabric linings insulate and make Edmont gloves comfortable to wear, as well as tough and snag-resistant.

"Redmont" heavy duty NEOX gloves have improved safety-grip finish

Non-slip finish cured *into* 30% thicker red NEOX coating. Longest wearing, safest glove made. Seamless wearing surface, extra wide thumb span, curved fingers.

Improved white-fabric-lined Grab-its, approved by safety engineers

Tough, flexible and positively non-slip natural rubber coating, bonded to extra sturdy all-white fabric base. Far outwear ordinary canvas and leather gloves.

"Grappler" plastic coated gloves far outwear leather, other plastics

Perfectly shaped to fit the hand and coated with DUROX, a new reinforced plastic extremely resistant to abrasion, oil and coolants. Permanently flexible. Note wing thumb and curved, pre-flexed fingers.

Hand-fitting Monkey-Grips with flexible plastic coating

Same wing thumbs and pre-flexed fingers as "Grappler" gloves. Fit the hand all over — no bagginess. Brown plastic coating is second only to "DUROX" in wearing quality and grip.

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Edmont

Edmont job-fitted gloves

approve your broadcasting the statement that he uses all scrap for casting his bushings. Customers have a habit of insisting that their castings conform to very definite chemical and physical specifications.

"The proposed revolutionary practice of taking the molds to the furnace, instead of transporting the metal by ladle from the furnace to the mold, is not exactly revolutionary. To mention one instance, cylinder blocks in the Ford foundry have been cast in that manner for many years. If you care to rewrite the story, confining your description to actual detail of equipment and molding methods, we might consider submitting it for publication. The value would be greatly enhanced by a few photos or drawings. In fact, if we had the photos we feel we could figure out the story for ourselves."

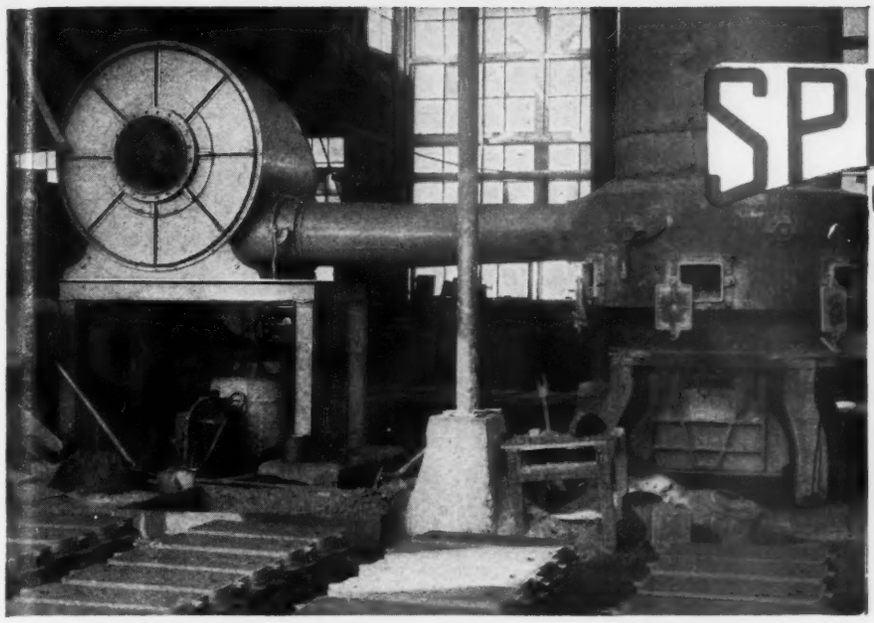
Sound Slide Film on High Property Iron Castings

A 30 minute sound slide film designed for showing to engineering groups, societies, employee meetings or other organizations interested in the use of high property iron castings for component parts is available from Meehanite Metal Corp., Pershing Square Bldg., New Rochelle, N. Y. It contains 43 frames illustrating applications in nearly every major industry and is accompanied by descriptive narration. It is available on a loan basis at no charge. A 32-page version of the same film has been published by Meehanite. It contains 43 illustrations and the narration. A copy will be sent free upon request.

Book Review

Proceedings of the American Society for Testing Materials, Vol. 51, 1951, cloth, 1322 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $12 to society members.

This volume contains all the reports of the various committees of the society as well as numerous technical papers with their discussions. In addition, it contains the annual address by the president, L. J. Markwardt, and the Marburg lecture on "Corrosion Testing" presented by F. L. LaQue. Committee reports are arranged in groups. Those pertaining to ferrous and nonferrous metals are of interest to foundrymen. Technical papers and discussions also are grouped, and those relating to metals cover a wide variety of subjects, including fatigue life, creep strength, mechanical properties, etc.



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A good, dependable air supply is the heart of any foundry operation. Once the amount of air for a given charge is determined, the Spencer Turbo will continue to provide the desired amount, day in and day out for years without interruption.

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And for Foundry Housekeeping——

Spencer Industrial Portable Vacuum Cleaners are solving the housekeeping problem in all types of foundries, large and small. Periodic overhead cleaning, picking up molding sand and cleaning molds, patterns and finished castings are a few of the jobs that make Spencer Vacuum pay for itself in a few months. Bulletins on request.

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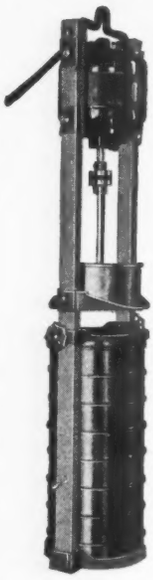
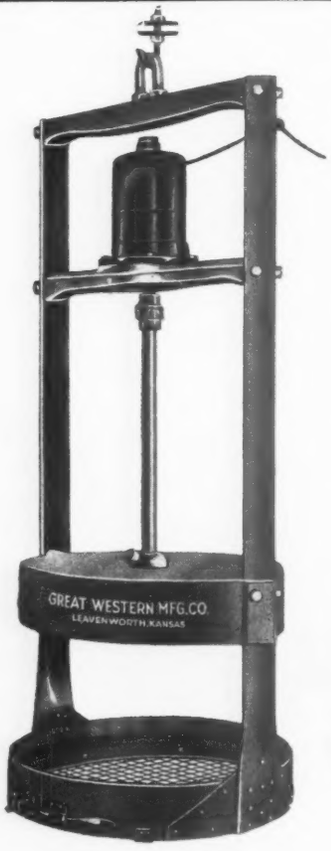
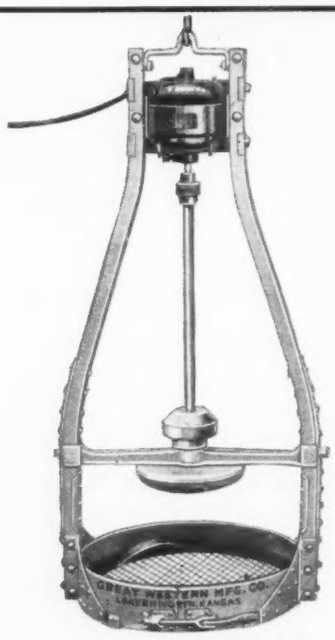


Type "HL" Lab Sifter for sand control $202.00 without sieves

Type "CS" with 24" square screen and automatic discharge $320.00.



Type "CR" with 24" sieve $310.00



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Research Contributions

(*Continued from page* 119)

eration.

Higher Physical Properties—In the last few years a great deal of work has been done in Great Britain on the use of cerium to improve the properties of cast iron, and it has succeeded in developing ductile or spheroidal cast iron. This work has been followed with great interest in the U.S.A., and its results are now in limited commercial use, except that the cerium has been substituted for by magnesium and various magnesium alloys.

Those of us in the steel casting industry became very much excited about these magnesium alloy additions for deoxidation purposes and started some experiments. It soon became apparent that because of excessive "fireworks," these alloys were too hazardous in the steel foundry. The magnesium content in the alloys had to be lowered to a maximum of 6 per cent at which point no beneficial effects were obtained. We decided, therefore, to experiment with cerium and mischmetals, which are generally known as rare earth elements.

In Fig. 14, the physical properties and the Charpy impact values at room temperature and at −40°F are tabulated in the normalized condition with and without the rare earth element additions to a low plain carbon steel (C—0.26, Mn—0.70), a medium carbon steel (C—0.40, Mn—0.70) and an intermediate manganese steel (C—0.30, Mn—1.60). Note the improvement in the ductility and Charpy impact values, both at room and subnormal temperatures.

In Fig. 15, the same steels are shown in the quenched and tempered condition. Again the same properties are increased to a considerable degree. The steels were made in a basic-lined induction furnace, deoxidized in the regular manner with aluminum and calcium-silicon and then followed with additions of 2 lb of mischmetal per ton of charge. Mischmetals contain 15 different rare earth elements, such as cerium, lanthanum, praseodymium, neodymium, samarium and all the other rare earth elements which are listed in the chemical periodicals.

Certain changes can be observed under the microscope which, no doubt, are partly responsible for the superior physical properties. In Fig. 16 the types of the inclusions are shown from a steel made with and without the additions of rare earth

(*Continued on page* 260)

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EXCEPTIONAL STRENGTH

No. 500 develops 25% greater baked strength than other core oils priced at $1.03 per gal. Because of this extra strength with No. 500, it is possible to cut oil ratios 25% and get good commercial cores. This extra strength at leaner ratios has proven especially valuable in malleable and nonferrous core practice.

PROTECTION AGAINST OVERBAKE

Although No. 500 reaches maximum baked strength very early in the baking cycle, it still retains 85% of its maximum strength one hour after reaching its peak. This retained strength gives a wide safety margin, especially where thick and thin core sections are baked side by side.

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At $1.03 per gal., No. 500 produces unmatched value, yet it is as fast or faster baking than other core oils. An extra economy is its greater strength over oils in its price class—greater by 25%.

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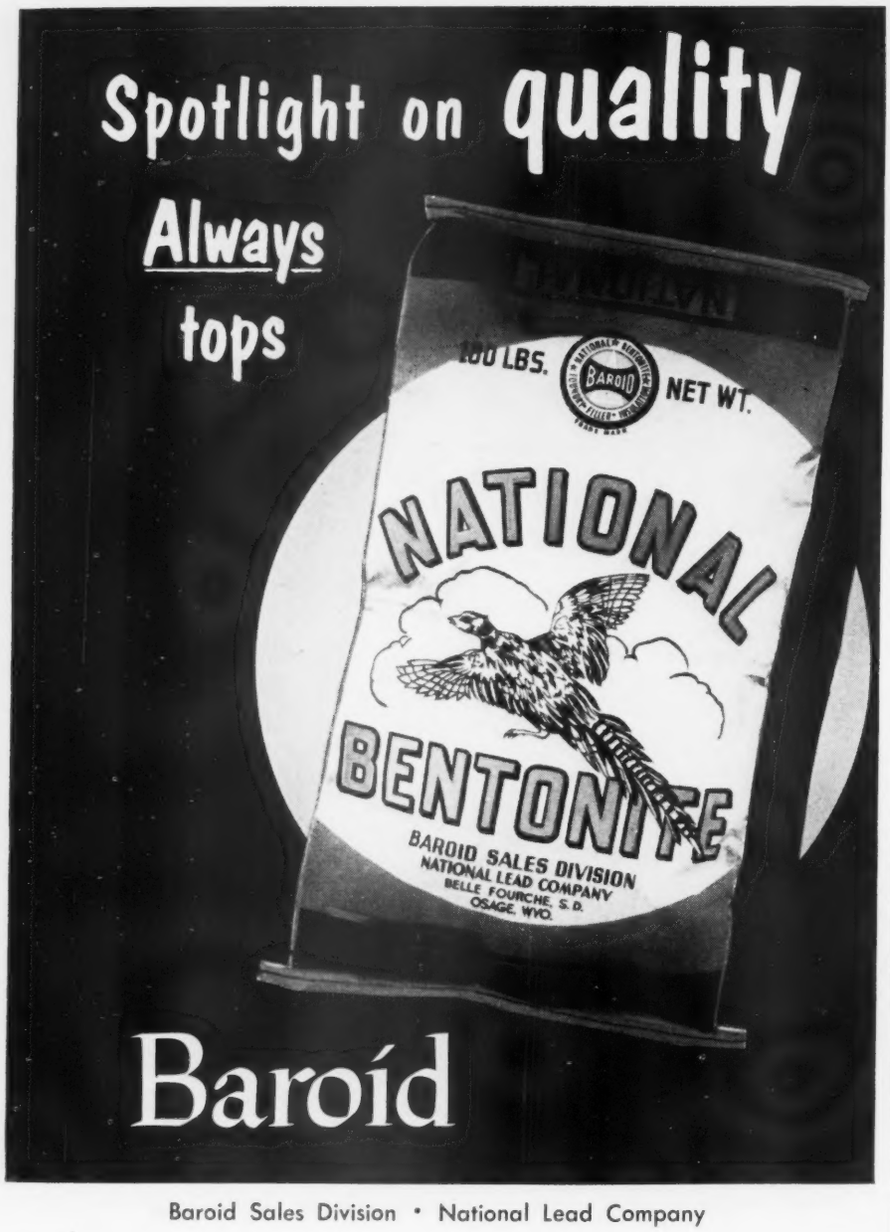
No. 500 has no offensive odor, no smoke. It is a very thin viscosity, light colored, free working oil that does not need the assistance of expensive release agents. Simply use No. 500 in your regular mix —reducing oil content 25% and cutting oven time 30% to begin with. Then make additional tests to see if oven time can be cut even more.

DEPENDABILITY

No. 500 has passed intensive laboratory and foundry trials, and has produced highly successful results in nonferrous, malleable, gray iron and steel foundries. In addition, No. 500 is backed by Werner G. Smith's life-time of experience and proven reputation for dependable core oils.



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(*Continued from page* 258)

elements, photomicrograph "A" representing the steel without the special additions and "B" the steel with the additions.

Steel "A" contains type III or crystalline inclusions, whereas steel "B" has type I or round inclusions. It is well known that if cast steels have predominately type I inclusions, superior properties are obtained. However, we do not believe that this change in nonmetallics is entirely responsible for the remarkable increase in the ductility and impact values.

In Fig. 17 the same steels, after a normalizing treatment, are shown in the etched condition. No significant difference can be observed, and this holds true for the normalized and quenched and tempered steels.

Further research studies were made with these steels, especially to determine their relative influence on fluidity and hot tearing. Fig. 18 shows the fluidity curves at various mold-entering temperatures. The fluidity of the steel treated with rare earth elements is increased, especially at the low mold entering temperatures.

Fig. 19 shows the influence of rare earth elements on the occurrence of hot tears as determined by the specially designed test casting. Note the lower hot tear rating with the addition of rare earth elements, a circumstance which, no doubt, is partly caused by the change from type III inclusions to type I.

It is indeed a very promising and interesting field for further research. What changes occur to the gases in the steel with these additions? What changes occur to the sulphur in the steel? Although all the reasons are not yet established, we know of several processing applications for cast steel treated with such additives.

Deoxidizers and Desulphurizers—It would be of great benefit to the steel casting industry, and especially to the acid open hearth and the acid electric furnace producers, if some alloy could be developed which would act as both an efficient deoxidizer and desulphurizer. This problem has been under consideration for many years, but no entirely satisfactory solution has been found. Progress has been made, however, and there is no doubt that such an alloy will be commercially available to the industry in the not very distant future.

Various encouraging experiments have been made with sodium additions, but because of the hazard involved in introducing it into the liquid steel, more experimental work is necessary. Another type of alloy in

various combinations which has exhibited great promise is the calcium-manganese-aluminum variations. A typical alloy with which we had some success both in basic and acid practices had the following approximate chemical analysis: calcium 20 per cent, silicon 45 per cent and aluminum 12 per cent. A decrease of approximately 5 points in the sulphur content is being obtained with this alloy combination. Perhaps by increasing the calcium and lowering the silicon content, we can obtain an even greater sulphur elimination.

In co-operation with the alloy producers, further work is contemplated, and it is hoped that through greater sulphur reduction, higher physical properties and fewer occurrences of hot tears may result.

Shell Molding—Since World War II considerable experimental work has been done to develop the shell molding process named after Croning of Hamburg, Germany. There is no doubt that this process has tremendous merits, not only from an economical viewpoint, but also from a casting quality viewpoint, and every effort should be exerted to increase the research activities on it. It has been reported that in the nonferrous as well as in the gray iron and high alloy casting industries, considerable progress has been made.

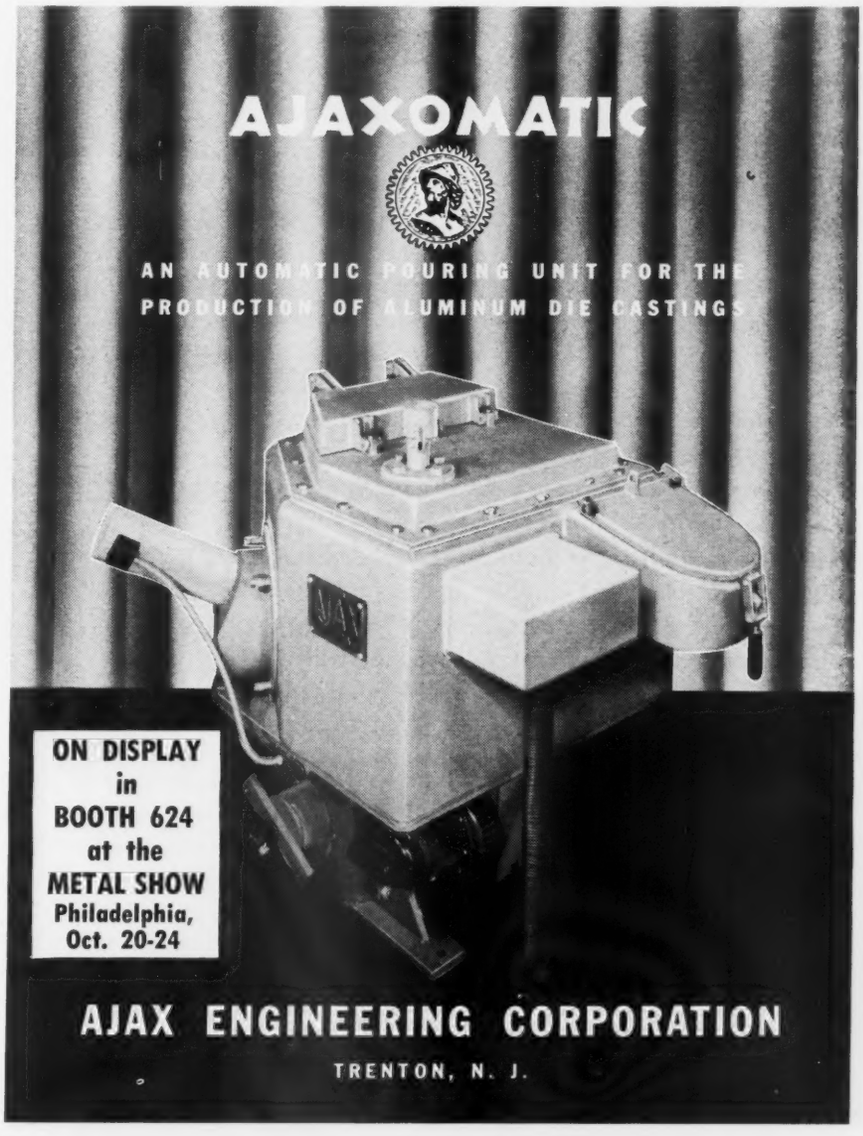
We have experimented with this process for approximately 2½ years. All of our experiments were made with induction furnace heats of plain medium carbon steels, deoxidized in the standard manner with aluminum and calcium-manganese-silicon. Fig. 20 illustrates the shell core with which we experimented.

This core is the same one that is being used for the center core on our hot tear experiments. No difficulties whatsoever were encountered in producing the cores when approximately 6 per cent of the special phenolic resins were used. The cores were smooth and strong, with sufficient permeability.

After the casting had been produced, however, sections were removed and etched in hot muriatic acid. Upon examination, we encountered small defects as illustrated in Fig. 21. These defects are small blowholes surrounded by steel high in carbon content as detected by a microscopic examination. This carbon pickup is, no doubt, due to a hydrocarbon evolution from the phenolic resin which will carburize the steel. This undesirable condition is shown in Fig. 22.

Many different phenolic resins have been tried, but in all cases the same results were obtained. It is impossible to relate all the experiments, but at this writing no successful results have been obtained. We are continuing to concentrate our efforts in search of other materials to develop this promising and economical

"Nope, never used it for making sausage, but it's an idea worth trying!"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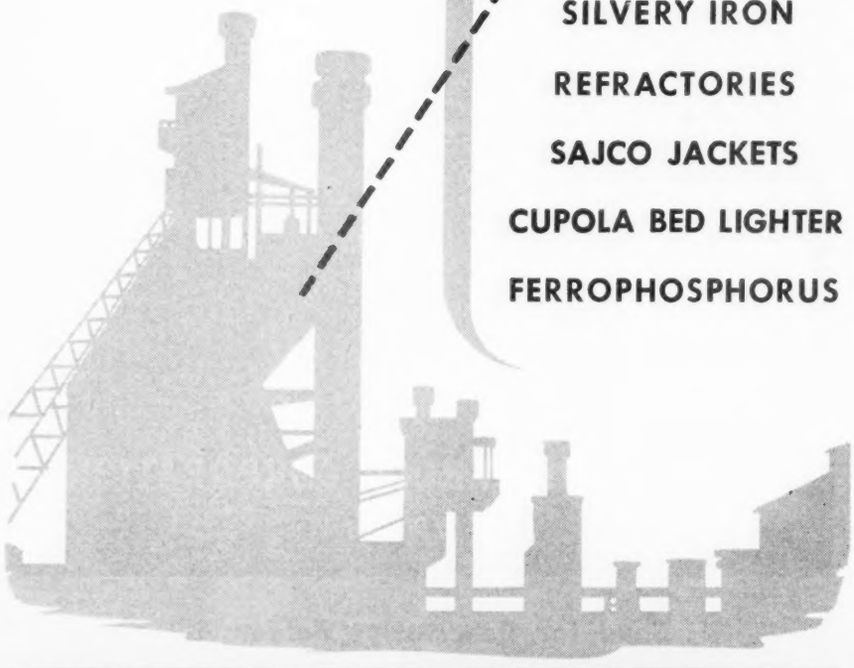

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procedure to produce cores.

During the last few years we have experimented a great deal at our foundries with the use of phenolic resins. Very few difficulties have been encountered and approximately 75 per cent of our cores are now made with the use of phenolic resins. This practice is more economical because the baking cycles have been shortened without deterioration of the quality of the castings.

It is simple to determine if a core has been underbaked since it is only necessary to drive out the moisture during the baking operation. With oil bonded cores it is impossible to determine when the core is properly baked. Even though the moisture of the core has been eliminated, the oil must be polymerized or oxidized to a certain degree to obtain a satisfactory core which will result in a casting free of defects.

Service Work — As in all steel foundries, suddenly and in many cases for unexplainable reasons, certain difficulties arise. Management, foundrymen and metallurgists sweat to find the cause and to correct the conditions. Occasionally a man from the research laboratory organization has to be delegated to determine the cause and remedy. This we term "Service Work for Plants." Not so long ago we had one interesting case which I would like to pass along since some one else might have experienced the same difficulties.

At one of our machining sources and on some of our castings, machining difficulties were encountered due to hard spots. The castings were made in a low-carbon steel and should have been entirely satisfactory. A section containing the hard spots was removed and microscopically investigated. To our surprise, directly at the surface a small layer of higher carbon content was observed which, in our opinion was responsible for the machining difficulties. This carbon pickup at the surface is shown in Fig. 23.

The core mix in this area was then investigated and was found to be responsible for the increase in the carbon content. The core mix was changed by eliminating some of the organic binders, and the undesirable condition was corrected as shown in Fig. 24. We are thankful that such cases are not too frequent since they take time away from our main job — research.

Service Failures — This subject could be easily handled by my saying that we do not have any service failures. However, in all foundries,

(*Concluded on page* 264)

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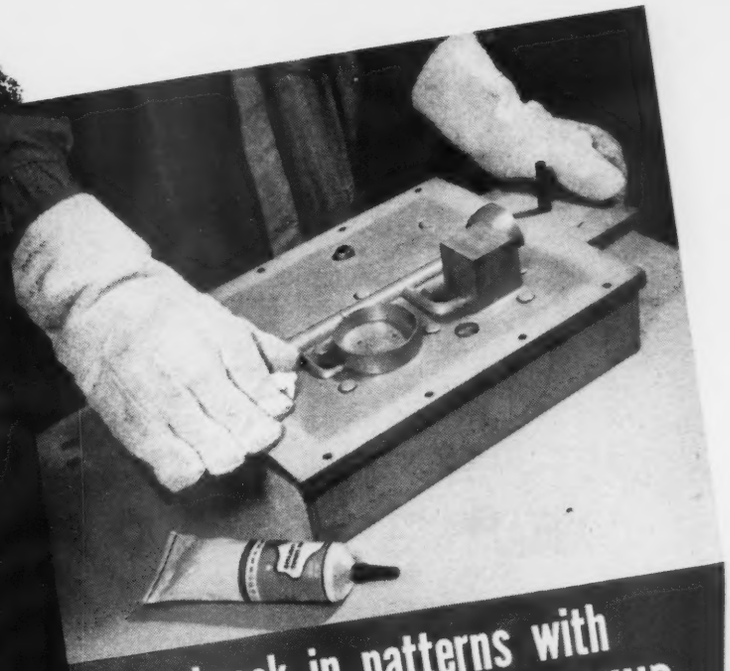

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Always break in new or freshly cleaned shell mold patterns with Dow Corning 7 Compound. Simply rub it on and heat the pattern briefly. Deep-section or highly complex plates may require a second or third treatment. The most effective parting agent known for shell molding, Dow Corning 7 Compound forms a continuous, semi-permanent coating which conditions the pattern and helps assure clean, easy release and smooth, uninterrupted production of even the most intricate shells.

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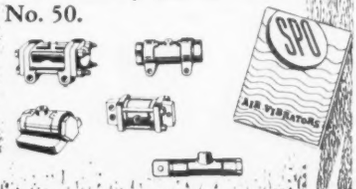
COST LESS!

Superior performance . . . maximum life . . . minimum cost . . . these features make SPO the best buy in air vibrators. You can depend upon these sturdy units to supply powerful, high-speed blows—day after day—for all your foundry vibration needs.

Key to **SPO** vibrator superiority is a special corrosion-proof bronze alloy cylinder liner which assures full-power starting, high-speed operation, low air consumption and maximum service life.

Whatever your vibration requirements, **SPO** has a model that will do the job.

For complete information, write today for Bulletin No. 50.



BLOW for BLOW . . .
You can't beat a SPO

SPO
749-SI
INCORPORATED
6449 Grand Division Avenue
Cleveland 25, Ohio

(*Concluded from page* 262)

and in fact in all industries, something occasionally goes wrong. We are minimizing service failures as much as possible through better design, service testing and the use of statistical quality control. Such procedures should be encouraged in all segments of our great industry.

Should a casting failure occur, we welcome an investigation because it often gives us new ideas as to further research work for the safety and well being of mankind.

I wish to express my deepest appreciation to C. G. Mickelson, J. A. Rassenfoss and J. D. Wozny for their splendid assistance in the preparation of this paper, as well as to the officials of the American Steel Foundries for their permission to publish the paper.

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6. "Metal Removal in the Cleaning of Steel Castings," Research Report No. 26, Technical Research Committee, Steel Founders' Society of America, Charles W. Briggs.

Four New Job Training Booklets Available

Four two-color, shirt-pocket-size booklets designed for general distribution to the industrial worker have been added to the National Safety Council's series of job training booklets.

"Steps to Safety" presents a check list of sound safety rules stressing topics of general interest such as materials handling, protective clothing, machinery guards, fire prevention and housekeeping. "It Pays to Dress Well" gives detailed information about protective clothing and equipment. "Ship Shape"' extols the advantages of good housekeeping. "Down Time" warns the worker that he must show his body the same consideration he does his machine if he is to avoid the high cost of human "down time."

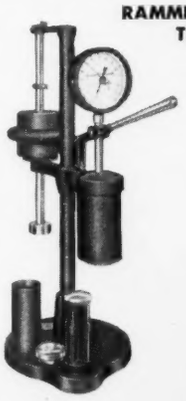
The booklets consist of 16 pages printed in color and illustrated with cartoons. They may be purchased from the National Safety Council, 425 N. Michigan Ave., Chicago 11, which will send free sample copies on request.

THE Short Cut TO LOW Scrap Losses

When consideration is given to the number of casting defects directly traceable to faulty sand practice, it becomes apparent that proper sand control is the short cut to low scrap losses.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for the program.



RAMMER-COMPRESSION TESTER—This simple unit combines ramming of specimens for permeability tests and making bond strength tests. Strength values are read on large dial.

PERMTESTER Permeability values for molding and core sand mixtures are shown on dial in a few minutes.

All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRY MAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

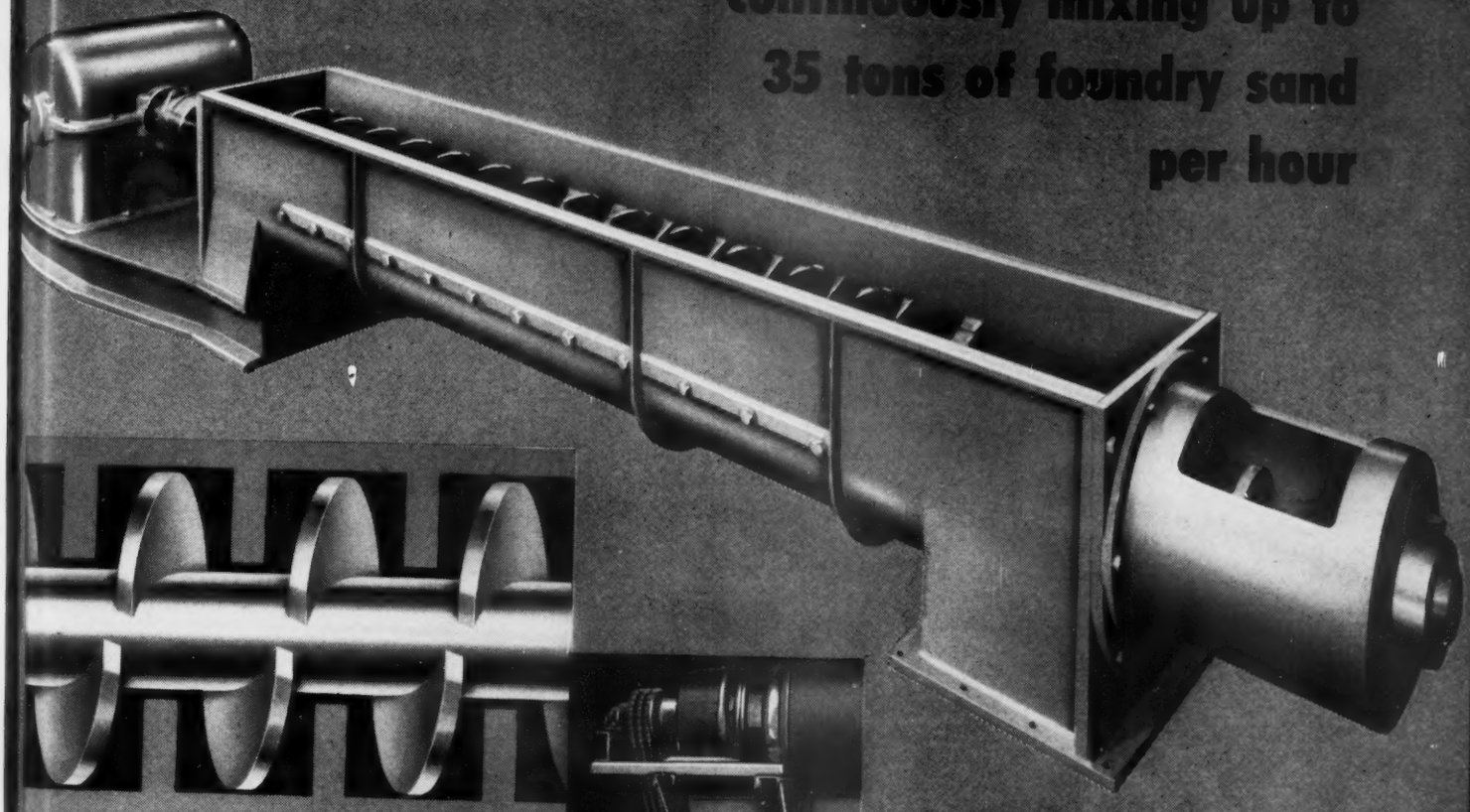
GORDON SERVICE

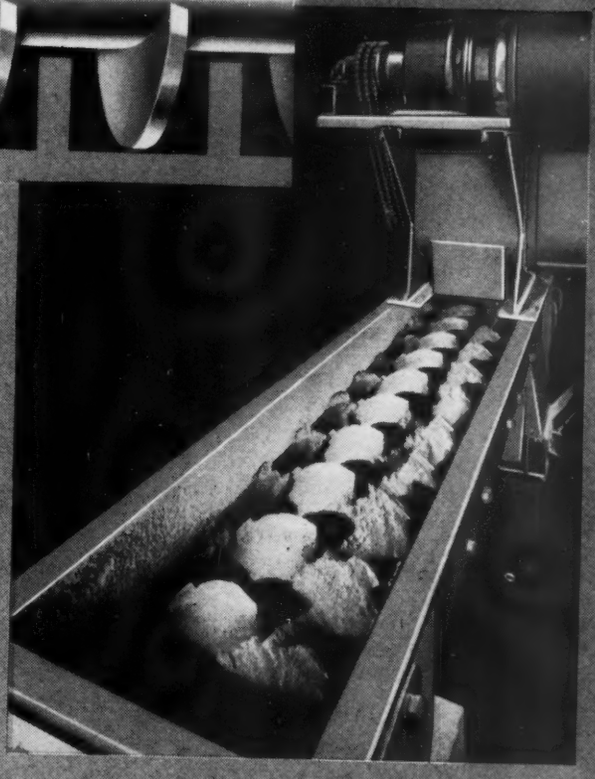
CLAUD S. GORDON CO.
Manufacturers & Distributors
Metallurgical Testing Machines • Industrial Furnaces & Ovens • Temperature Control Instruments • Thermocouples & Accessories
Dept. 20 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 20 • 2035 Hamilton Ave., Cleveland 14, Ohio

Baker Perkins Ko-Kneader

(LIST SYSTEM)

an efficient new unit for continuously mixing up to 35 tons of foundry sand per hour





B-P Ko-Kneader in operation handling foundry sand

With revolutionary Baker Perkins Type M List System Ko-Kneaders, continuous mixing of foundry sand becomes a highly practical operation. Essentially, the Ko-Kneader is a mixing worm revolving as well as reciprocating in a trough provided with kneading teeth in such a way that the mixing worm works as a single mixing machine with each tooth. The repetition of this operation, as the sand moves along the trough, completes the mixing and mulling. Baker Perkins Ko-Kneaders save considerable mulling time and also help to improve casting quality because the intense mixing action blends the sand uniformly and thoroughly. Baker Perkins Ko-Kneaders are ruggedly built for long life and dependable service. When used with specially designed Baker Perkins Feeders, operation of the Ko-Kneader is almost entirely automatic, resulting in substantial savings in labor costs. Consult a Baker Perkins sales engineer or write today for complete information.

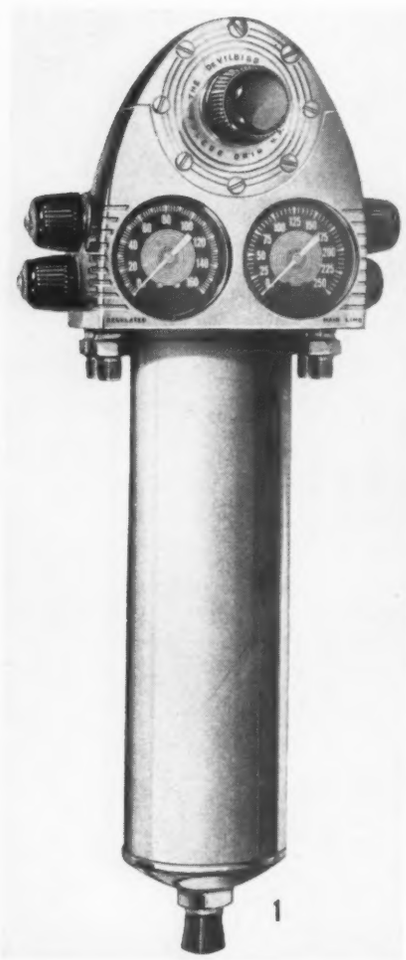
BAKER PERKINS INC. foundry equipment sales • saginaw, michigan

New EQUIPMENT and Supplies

For Additional Information on these Items Use Reply Card—Page 269

(1)—Air Transformer: DeVilbiss Co., 300 Phillips St., Toledo 10, O.—Air transformer has a built-in, two-stage regulating principle which provides for adjustment of pressures by finger tip control of the adjusting knob. The oil and moisture present in all compressed air lines is eliminated by the transformer, which traps the liquids and delivers clean air to all outlets. The manufacturer says that in tests 97 per cent of entrained water was removed from 100 cfm of air at 100 lb pressure. The transformer has two regulated air outlets and two unregulated. Capacity is 100 cfm. Oil and moisture captured in the condenser tube is easily drained by a push-pull drain knob.

For More Details Circle No. 1—Page 269



1

(2)—Pneumatic Hoist: Keller Tool Co., Grand Haven, Mich.—Improvements have been made in the company's air hoists. Safety hooks are now standard equipment for the load hook, optional for the suspension hook. Lubrication system and brake have been improved, an extra bearing has been added to the motor drive shaft, the control lever is heavier, ring gears are now hardened, and pendent controls for handling unwieldy loads are available optionally, as are a number of accessories. These hoists are said not to burn out from stalling and to be virtually unaffected by dust and fume-laden air.

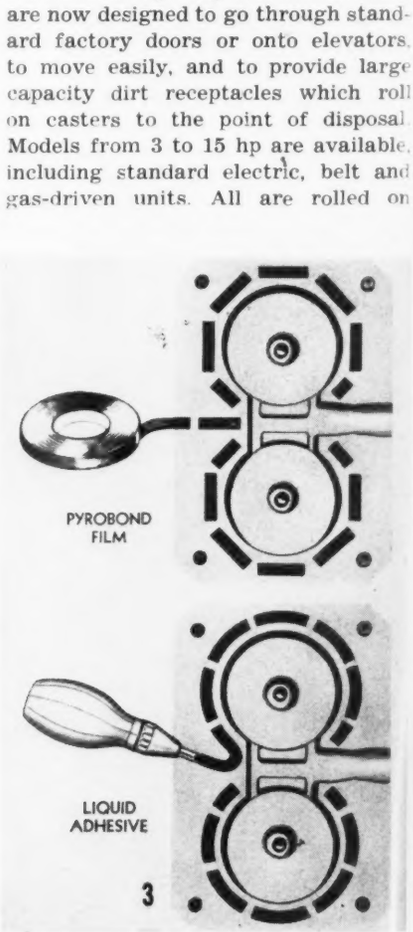
For More Details Circle No. 2—Page 269

2

(3)—Shell Mold Bond: World Bestos, New Castle, Ind.—Adhesive, applied to shell mold halves as a film or liquid, joins the halves after heat curing, without clamps or bolts. It eliminates the need for shot or sand backing of many molds. In film form it is laid between the halves while they still retain enough heat to cure the adhesive. The halves are removed from the pattern plates simultaneously, and retained heat cures the adhesive. The liquid is used when the halves are cured at different times. It is applied to the cold halves, which are then placed in an oven long enough to cure the adhesive.

For More Details Circle No. 3—Page 269

(4)—Vacuum Cleaners: Spencer Turbine Co., Hartford 6, Conn.—Portable heavy duty vacuum cleaners are now designed to go through standard factory doors or onto elevators, to move easily, and to provide large capacity dirt receptacles which roll on casters to the point of disposal. Models from 3 to 15 hp are available, including standard electric, belt and gas-driven units. All are rolled on



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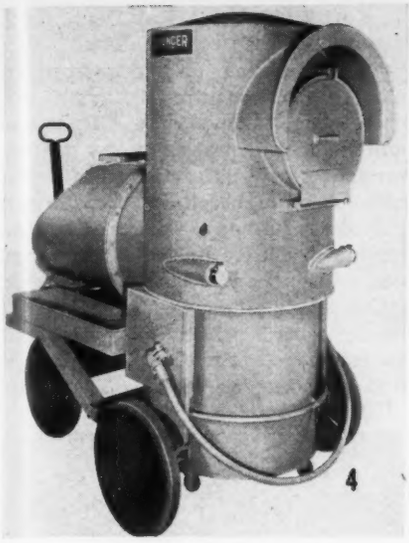


roller bearing wheels, and in each the dirt can is released by a hand lever and moved on casters.

For More Details Circle No. 4—Page 269

Sand Driers: Viloco Railway Equipment Co., 322 South Michigan Ave., Chicago 4—Sand driers come in three sizes, capable of drying 500, 1000 and 5000-6000 lb of sand per hour. The first two, with 27 cu ft and 3 cu yd capacity, respectively, are vertical type installations, automatic in operation. The 500-lb model is gas fired, the 1000-lb model oil fired. Wet sand does not come in contact with the heat chamber because the entire chamber and top are surrounded with grating. The 2½ to 3 ton model is a rotary sand drier, either oil or gas fired, which dries by direct heat. It feeds, dries and screens without attention, is mounted on channels in a unit ready to install, and can be installed in existing sand houses.

For More Details Circle No. 5—Page 269

Core Bonding Resin: Borden Co., Chemical Division, 350 Madison Ave., New York 17—A powdered, phenolic core bonding resin has been developed which is suitable for curing in di-electric ovens. It responds well to the temperatures characteristic of di-electric core ovens, has long, stable storage life and imparts green strength to the uncured core.

For More Details Circle No. 6—Page 269

Mobile Crane: Silent Hoist & Crane Co. Inc., 841-877 63rd St., Brooklyn 20, N. Y. — Dual seats and dual operator controls have been added to the company's swing-boom mobile crane in order to eliminate turning the machine around in congested areas or narrow aisles. Also, the mobile crane has been integrally linked with a trailer, so that in addition to its regular uses it provides a means of carrying and delivering quantities of bulky material.

For More Details Circle No. 7—Page 269

Floor Resurfacer: Dasco Chemical Co., 1602 Thames St., Baltimore —A grease and oil resistant plastic floor resurfacer can be laid over old wood, concrete or metal floors that must withstand heavy traffic. No water or other ingredients are required to make the application, nor is any bonding agent or primer necessary. The resurfacer contains no tar, asphalt, asphalt emulsion, magnesite, calcium chloride, aluminum stearate, gypsum or metallics. It may be applied ¼ in. to ⅜ in. thick and is available in red, black and green.

For More Details Circle No. 8—Page 269

Machine Produces Shell Molds Automatically

MACHINE forms shell molds by performing the following sequence of operation: Application of parting to the pattern, preheating of pattern, coating of pattern with sand-resin mix, curing of shell mold and stripping of mold from pattern. The machine is 7 ft 6 in. wide, 9 ft 6 in. long and 8 ft 4 in. high (maximum). It weighs about 12,500 lb.

Maximum net pattern area is 26 x 41 in.; pattern plate size, 30 x 45 in. and maximum draw, 6 in. It requires air pressure above 80 psi and air volume of approximately 7 cfm. Motive power is 200 or 440 v, control circuit 110 v; both are 3 phase, 60 cycle. Heating medium is gas.

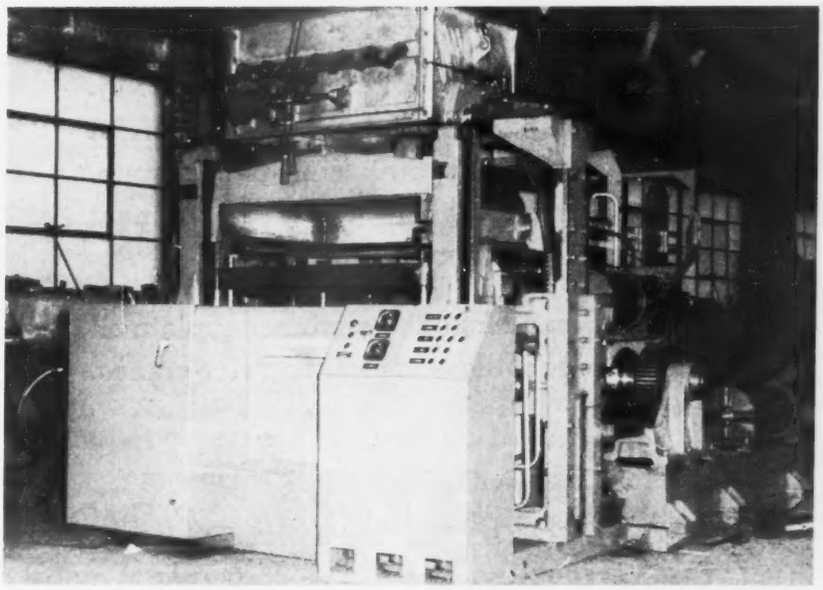
The parting agent is sprayed on, without atomizing, from 50 psi jets. Preheating is accomplished by gas burners or electric heaters applied to the pattern plate, or, if the presence of stripper pins in unpredictable parts of the pattern area makes that procedure inadvisable, the curing oven may be positioned over the pattern. For purposes of coating, louvers are opened which drop the sand mix over the pattern. The assembly remains in that position for the length of the coating dwell, which is pre-set by a timer in the control station, as are pattern preheat and curing.

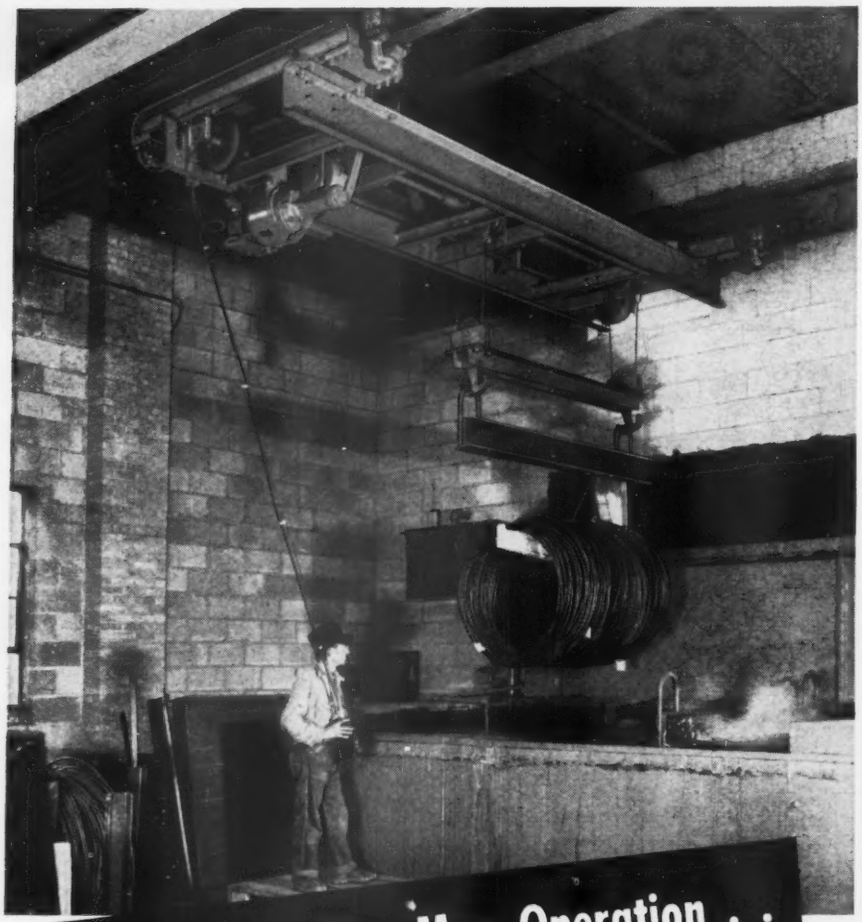
For curing, the curing oven is conveyed over the pattern by a carriage which moves on guide rails and is actuated by push rod and air cylinder. When the curing oven is returned to its original position, the mold may be stripped from the pattern faceup. For that purpose the drain tank is raised until it contacts the ejector plate and beyond that until the mold is stripped clear of the pattern. Automatic mold removal equipment is available.

The control panel for operating the machine is located within easy reach of the operator's hand, in the front of the machine. A semi-automatic control system is available alternately.

Operating time of the cycle, including spray and preheat, is 39 seconds; without preheat it is 23 seconds. The machine known as type SU-1, was developed by Shell-mold & Machine Co. Inc., 65 Pine St., New York 5.

For More Details Circle No. 9—Page 269





with **AMERICAN MONORAIL**

Here's an operation that must be on the go, all the time and fast, and yet, one man plus an American MonoRail Crane keeps the line flowing smoothly and fast. Fast operating, constant service, American MonoRail Cranes are ruggedly built to handle loads up to 10 tons at operating speeds of 500 feet per minute. Articulated trolleys assure perfect alignment of trucks for smooth crane travel.

Let an American MonoRail engineer explain all the advantages of these constant service cranes.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

X-Ray Unit: X-Ray Dept., General Electric Co., Milwaukee 14—An x-ray diffraction unit designed for film technics requires but half the floor space taken by an all-purpose unit and provides an x-ray source for all x-ray diffraction film technics. The high-voltage transformer provides full-wave rectified, end-grounded voltage up to 50 kvp at 50 ma continuously. The tube current stabilizer is an instantaneous electronic control which holds the tube current constant within plus or minus 0.02 per cent or better. The housing provides for mounting an electronic line-voltage stabilizer if desired. Height of the target of the CA-7 x-ray tube is nominally 10.5 in., but is fully adjustable from 8 to 13 in. above the top. The camera track can be adjustable from 0 to 10° below horizontal for optimum target take-off angle and from 0 to 45° above horizontal for use of crystal monochromators. The focal spot in the CA-7 tube is about 1 in. from the end of the tube and the pure beryllium windows, and is long and narrow. Up to three cameras can be mounted on top of the unit. The unit has a self-contained water cooler.

For More Details Circle No. 10—Page 269

Flameproofing Agent: Foundry Rubber Inc., 4914 Bethesda Ave., Bethesda, Md.—Flameproofing agent is a water-based solution that is odorless, colorless and nonirritating to the skin and does not change the texture, finish or color of materials to which it is applied. It prevents wooden flasks and bottom boards in foundries from bursting into flames when molten metals are spilled on them, the manufacturer claims, and is also ideal for flameproofing work

(*Continued on page 274*)

HELPFUL IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "Idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

40. Airless Blast Cleaning

American Wheelabrator & Equipment Co.—20-page illustrated catalog 254-A is descriptive of Wheelabrator Tumblasts and explains why this is the modern method of blast cleaning and finishing metal products such as castings, forgings and heat-treated parts on a production basis. Operating principle and available types of equipment are covered.

41. Core & Mold Ovens

Foundry Equipment Co.—Portable, rolling drawer, quick-dry, Transrack, tower, car type, horizontal and continuous core and mold ovens are some of the types that are described briefly in 6-page illustrated folder 48. Sizes can be engineered for every need.

42. Need a Pump?

Yeomans Brothers Co.—"Yeomans Pumps for Industrial Process Applications" is the title of 12-page illustrated manual 2301. Points to consider in pump selection, handling corrosive and noncorrosive liquids, solids-carrying liquids, and pumping dry and semidry materials are some of the problems that are discussed.

43. Sprue Nipper

Rice Pump & Machine Co.—It's easy to trim sprues and gates from nonferrous castings with the Tessmer sprue cutter. For details of various models of this power driven press that clips sprues cleanly, just get a copy of the descriptive 4-page bulletin.

44. Manufacturing Facilities

Burt Mfg. Co.—"50th Anniversary" is 24-page review of progress of this company which specializes in gravity and fan type roof ventilators, ventilating wall louvers, oil filters and exhaust heads, and sheet metal specialties. Engineering and production personnel and equipment are described.

45. Wearproof Blast Nozzles

Norton Co.—Having trouble with nozzle wear and the need for frequent replacement? You find the answer to your problems in Norbide pressure blast nozzles. There's a size and type for every need detailed in a 12-page illustrated folder. It's yours for the asking.

46. Bulk Materials Conveyors

Ajax Flexible Coupling Co. — To solve the bulk of your bulk material conveying problems, you might take a look at the Lo-Veyors described and illustrated in 16-page bulletin 39. Unit consists of a pan or tube, a self-contained vibrating or shaking machine and a power source for operating vibrating unit. Shake it up a little and get this bulletin.

47. Core Boxes

Industrial Pattern Works—Duplicast expendable core boxes and blower core boxes are subjects of two illustrated four-page bulletins. Advantages are cited.

48. Refractories & Specialties

Mexico Refractories Co. — What can't be found in 104-page pocket size catalog "Better Refractories" on fireclay, high alumina and silica brick and refractory specialties isn't worth knowing. Featured are tabulated combinations of brick sizes required to turn circles or form arches, decimal equivalents and an 111-word glossary of terms. Dimensional drawings of standard bricks and special shapes are included.

49. Small Parts Finishing

Roto-Finish Co.—Are you going round and round on grinding, deburring, descaling, polishing, britehoning or coloring problems relative to small parts? Better get off the merry-go-round and look into this Roto-Finish process described in 16-page illustrated brochure. What it is, how it works, getting best results, types of parts it handles and the machines, chips and compounds that do the job are all covered.

50. Overhead Traveling Cranes

Reading Chain & Block Corp. — Learn "The Why and How of Faster Production" by getting 16-page brochure on Reading traveling cranes. Excellently pictured are the crane trolleys, end truck construction, gear cases, bridge drives and control cabs as well as some prominent installations throughout the country.

51. Induction Heating & Melting

Ajax Electrothermic Corp.—We induce you to read "Induction Heating & Melting," an 8-page illustrated bulletin on Ajax-Northrup induction furnaces which offer quality melting, precision control and fast melting speeds. Equipment for every melting or heating application is shown, and a selector chart is included.

52. Air Vibrators

SPO Inc.—SPOsen you wanted to shake the daylights out of your bins and hoppers for positive flow of bulk materials, or to settle dry or semi-liquid materials. What would do the job? To be SPOcific, SPO pneumatic vibrators, natch! Performance isn't SPOradic—it's dependable, according to 8-page bulletin 50. Be a SPOrt and send for it. We have SPOken!

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Ideas for Foundrymen" in this issue—simply circle corresponding item numbers on accompanying cards

Helpful IDEAS

53. More Refractories

Norton Co.—"Have You Something Hot to Handle?" If so, get acquainted with Norton refractories by reading 24-page form 216-1P. Alundum, Crystolon, Magnorite and fused stabilized Zirconia refractories are described as well as forms in which they are available.

54. Chargers, Buckets, Loaders

Modern Equipment Co. — Mechanical chargers, small-cone buckets and coke and stone loaders are effectively described and illustrated in 4-page folder supplement S-147-B. Four bucket sizes are tabulated with other charge data.

55. Liquid Core Binder

Swan-Finch Oil Corp.—Tykor liquid core binder will help you reduce shake-out time and labor, cut cleaning room costs, increase oven capacity, eliminate shrinkage cracks and reduce core gas and smoke. How? 4-page illustrated bulletin will tell you. Send for it!

56. Recovering Porous Castings

Tincher Products Co.—Like quiz programs? Then you'll enjoy, as well as profit by, reading 32-page "The Tincher Process for Recovery of Rejects Due to Porosity in Castings and Parts." It's written in question and answer form. Get yours today.

57. Power Conveyors

Lake Shore Engineering Co.—For fast, safe, low cost handling of bulk materials, packaged goods or what-have-you, consider the lightweight portable power conveyors described in 8-page catalog 495 which carry the brand Tote-All. 'Taint all bunk either. Four models are covered.

58. Cupola Capers

Whiting Corp.—Here's two 6-page folders, FO-2 and FO-3, just waiting to be asked for. They're entitled "Tips on Improving Cupola Charging!" and "Hot-Blast for Better Melt, Closer Control, Greater Economy." So, what you waiting for?

59. Carbon & Graphite Brick

National Carbon Co.—Carbon and graphite brick, for corrosive chemicals and hot molten metals, is as slick a brick as you can git. Sizes and physical properties are tabulated in 8-page catalog section S-6210.

60. Pneumatic Molding Machines

British Moulding Machine Co., Ltd. —I say old boy, you cahn't go wrong with type B.T. pneumatic jolt, squeeze, turnover and pattern draw molding machines. They're illustrated and specified in 34-page booklet AB/658. Performance is rahther good you know, jolt capacity, 400 lb; squeeze pressure 7000 lb; pattern draw, 8 in. —ripping, what?

61. Tools, Tools, Tools

Wellman Products Co.—Anything and everything that you may want in line of tools for patternmakers, cabinetmakers, model builders and home craftsmen, including carving and wood turning tools is listed in 114-page catalog T-52. Descriptions, drawings or photos and specs are given on each item. What ain't cataloged in this catalog ain't worth being cataloged.

62. Optical Pyrometer

Leeds & Northrup Co.—You need optics if you can't see the advantages in potentiometer type optical pyrometer described and illustrated in 16-page catalog N-33D. Instrument can be used to sight into furnaces, kilns, soaking pits or on white hot ingots, rolling mill work or the latest French movie, and reads directly in temperature degrees.

63. Foundry Flasks

Truscon Steel Co.—Molding's no task—with a Truscon flask. Casting is easy—shake-out is breezy. For descriptions nifty—get booklet P-50. It'll give you the dope—on drag, check and cope. For you foundry sages—these 16 pages on better casting — are yours for the asking. Burma shave.

64. Why Shell Molding?

Borden Co., Chemical Div.—Here's one of those "what you should know" booklets that'll pay-off better than two bucks on Sea Biscuit. The Shell Molding process loses its mystery and becomes a practical means for producing accurate castings at low cost in production quantities. Aid is offered to adapt Shell Molding to your needs.

65. Foundry Abrasives

Carborundum Co.—What abrasive to use where, could well be the title of 12-page illustrated booklet No. 4. It's actually entitled "Abrasive Products for the Foundry." In addition to citing proper wheel, rub or blasting grain, book gives complete condensed specs on line of abrasive products that are engineered for foundry use.

66. Detects Defects

Radium Chemical Co.—Radium is a tool of industry. With it, you can nondestructively test the largest of castings for flaws or inclusions and determine accurately if the casting will perform the service for which it was made. If you want the full story of how to use radium radiography in your plant, you'd better get a copy of the 48-page guide book "Instructions for Radium Radiography."

67. How Dry I Am

Link-Belt Co. — Pardon, monsieur, have you heard about zee grande Roto-Louvre Dryaire weech makes dry any, ah—how you say—bulk materials from ores to les granules—even cafe beans and macaroni. Zee machine is fast and tres gentil. One voyage through le Dryaire, et voila, your powders sing "How Dry I Am." For all zee particulairs, you can get booklet numero 1911-B. Merci!

68. A Clean Part

Acheson Colloids Corp.—Permanent molds, patterns, flask pins, ladle interiors and chills can all be beneficially coated with "dag" colloidal graphite. It fights friction, improves parting and affords protection against the harmful effects of heat. Interested? You'll get the whole story in 6-page illustrated folder "Colloidal Graphite in the Foundry." Send for it!

69. Pneumatic Cylinders

Miller Motor Co.—The JIC Standards that apply to pneumatic cylinders and the Miller cylinders that comply with these standards are subject of 12-page illustrated bulletin. If you use cylinders, (and what foundry doesn't?) you'll find this useful.

70. Shell Molding Data

Monsanto Chemical Co., Plastics Div.—Here's a bulletin prepared expressly for foundrymen that gives as much factual information as is available on the "C" process for making molds and cores for foundry use. All phases, techniques used, selection of material and equipment, and resin

For Foundrymen

binders are some of the subjects covered. If you're using or thinking of using the shell molding process, it will be to your advantage to get a copy of this 16-page bulletin No. 61.

71. Any Type Oven

Carl-Mayer Corp. — Whether its large or small, this company can supply core and mold ovens of rack, car, shelf, portable, drawer, vertical, monorail and horizontal conveyor type. They can be heated with gas, oil, coke, coal, electricity or steam. Typical units and performance data on them are included in 8-page illustrated bulletin 141.

72. Knead Mixers?

Baker Perkins Inc.—Anything that needs to be kneaded or mixed can be handled by the new line of "list system" ko-kneaders. There's a size and type for every foundry sand, plastic refractory or other material need. If you're mixed up on your mixing or have need for a kneader, get a copy of 4-page illustrated bulletin 5-1151.

73. Burn Oil Safely

Drying Systems, Inc.—8-page illustrated bulletins C-2 and C-9 are descriptive of the Dry-Sys electronic safety control for gas or oil fired equipment and of Dry-Sys oil level control unit for pumping, preheating and circulating oil on industrial oil burner systems, respectively.

74. Air Powered Valve

Bellows Co.—Whether it's pushy, pully or holdy, the Bellows Electroair valve controls air power with the greatest of ease. It's electric solenoid controlled, but line air power takes over all of the work of shifting the stainless steel valve which can remotely control practically any cylinder. The complete story is told in 6-page folder AV-300.

75. Portable Electric Tools

Black & Decker Mfg. Co.—Hey! Here's a dandy. The answers to your every question on capacity, speed, weight, dimensions, features and prices of an extremely complete line of portable electric tools are given in "1952 Standard Catalog." Covered are portable electric drills, tappers, screwdrivers, sanders, polishers, grinders, shears, vacuum cleaners, hammers, saws and accessories.

76. Molding Machine

Herman Pneumatic Machine Co. — Mold making is a cinch with the new pitless jar rollover and pattern drawing machine. What's its capacity? 1500 lb. How does it work? Mostly by hydraulics. We needn't go into it further. The 4-page illustrated bulletin "It's a Herman" does a better job than we can, so why not send for it.

77. Core Blower

Redford Iron & Equipment Co.—No ill wind that blows nobody good is the No. 2 stationary magazine type core blower described in 4-page illustrated bulletin. It's fast, its accurate and its easy to use. Simply connect it to the shop air line and you're in the core business, but good.

78. Ovens—Ovens—Ovens

Detroit Sheet Metal Works—Fast processing, uniform baking, minimum of rejects and close temperature limits are features of DSM ovens that are designed for specific foundry uses. Typical types are shown in 4-page illustrated folder.

79. Warm Air Heaters

Dravo Corp.—It's not yet time to turn on the heat, but do you have enough to turn on? In 8-page illustrated bulletin 526 you can read how the Dravo Counterflo direct-fired warm air heaters can bring increased comfort into your buildings. Output and design features are covered for these versatile units.

80. Hydraulic Lifts

Big Joe Mfg. Co.—Keep your materials handling on the go with hydraulic lifts by Big Joe. You'll never be stuck with this speedy truck that'll save you plenty of dough. So you'd better hop to it and get bulletin "Let Big Joe Do It."

81. Floor Absorbent

Wyandotte Chemicals Corp.—Questions and answers on Zorball all-purpose floor absorbent are available by checking this number. What it is, how it works, etc., are covered. Keep your help on safe footing by spreading Zorball.

10-52

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Penton Building, Cleveland 13, Ohio

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82. No More Dust or Fumes

Claude B. Schneible Co.—You won't be fuming or singing "Smoke Gets In Your Eyes" if your foundry uses the dust, fume and smoke hoods for shakeouts, pouring stations and mold conveyors described in 16-page illustrated bulletin No. 450. How each of several Uni-Flo type units operate is described. They incorporate the compensating air feature to reduce drafts and heat loss.

83. Your Foundry Uses Them

Johnston Mfg. Co.—Check this item for your money's worth. Series of illustrated "datalog" sheets covers brass melting furnaces, heating torches, reverse blast oil burners, gas burners, blowers, car bottom furnaces. Features, specifications and sizes available are given.

84. Overhead Handling

American Monorail Co.—Overhead becomes an asset when it's used to handle materials. The company makes an automatic dispatch system that moves stuff from here to there or anywhere the monorail track leads merely by pushing a button and turning a selector switch. If you don't believe it, get a copy of bulletin AD-1 on Automatic Monorail Dispatch Systems.

85. Refractories

Johns-Manville—Here's what you get in this illustrated 12-page brochure: "Hydraulic Setting Refractories": The dope on five different Firecrete products for casting special shapes and three Blazecrete products for gunning and slap troweling; maintenance suggestions, photos of typical uses; many tables of data.

86. Air Compressor

Chicago Pneumatic Tool Co.—First with antifriction roller bearings throughout is claim made for class H-CE 1000-2000 hp horizontal four-corner motor driven air compressors, described in 12-page illustrated bulletin 726-5 Supplement C. It elaborates on many design features.

87. Grinding & Cutoff Wheels

Chicago Wheel & Mfg. Co.—Is your file girl named Frances? Whether or not, have her file this 64-page pocket-sized "Chicago Wheel Manual." You'll look a long while to get a better source of info on cutoff wheels, grinding wheels, mounted wheels, Handee electric tools, steel cutters, etc., etc.

88. Shell Molding

Bakelite Co.—The Croning or "C" process is important conversation wherever metals are cast. There's no need to be left out. You, too, can become fully familiar with shell molding procedures and techniques. Technical data book "Bakelite Phenolic Resins for Foundry Molds and Cores" is a practical and understandable treatise on this subject. It's yours for the asking.

89. Wire Rope Assemblies

Macwhyte Co.—"You're better off at the end of your rope" should be the slogan for this line of Safe-Lock wire rope assemblies. Industrial Standards catalog 5201 illustrates and gives specifications for wire rope with fittings permanently attached. Over 20 pages of good data.

90. Core & Mold Coatings & Oils

Thiem Products Inc.—Various types of high refractory core and mold coatings and core oils for specific requirements are described in 4-page bulletin. Types for gray iron, steel and nonferrous foundries are listed and their features are outlined.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

91. Increased Foundry Capacity

Remember some time ago when FOUNDRY ran a series "Studebaker Doubles Foundry Capacity?" Well, here it is in reprint form—32 pages with many illustrations which give you all the details in this most up-to-date foundry. You'll find it very interesting.

92. Gray Iron Casting Design

Fundamentals to be observed in designing gray iron castings are discussed in this article, a FOUNDRY reprint, by Thomas E. Eagan, research metallurgist of Cooper-Bessemer Corp. Many design considerations are shown in this 4-page article which is a condensation of an ASME paper.

93. Doubling Production

In a little excursion north of the border, Associate Editor Robert H. Herrmann tells you how Massey-Harris Co. foundry at Brantford, Ont., has doubled its production. Eight illustrated pages of this reprint let you in on the planning and operational techniques.

94. Nickel-Alloyed Castings

James S. Vanick, a metallurgist of International Nickel Co. has written an article "Nickel-Alloyed Brass and Bronze Castings" which presents much information in graph and table form. He explains the whys and wherefores of this technique in this reprint of a recent FOUNDRY article.

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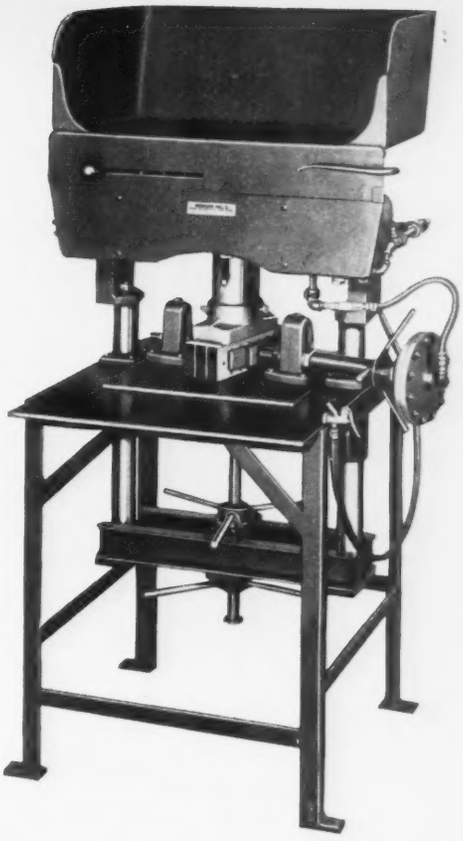
Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



THE NO. 2 STATIONARY MAGAZINE TYPE

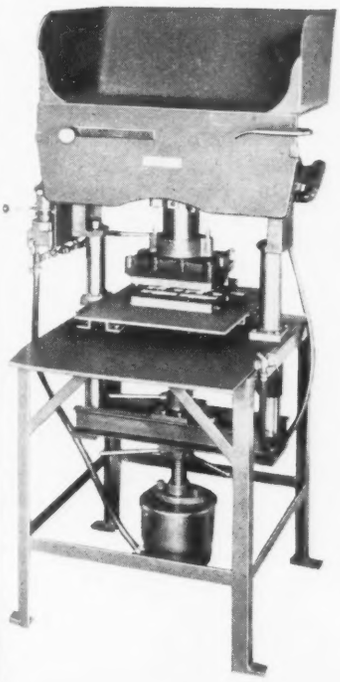
8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

Write for Specification Bulletin "F"

THE No. 2-D CORE BLOWER



A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

THE CARTRIDGE TYPE BENCH CORE BLOWER

The original small core blower . . Proven simplicity, speed and flexibility. Makes cores up to 2#.

Thousands in use in American Foundries . .

Write for Specification Bulletin "G"

SIX FEATURES:

1. MAXIMUM SAFETY—Operator must use both hands at once to clamp core box and blow cores.
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

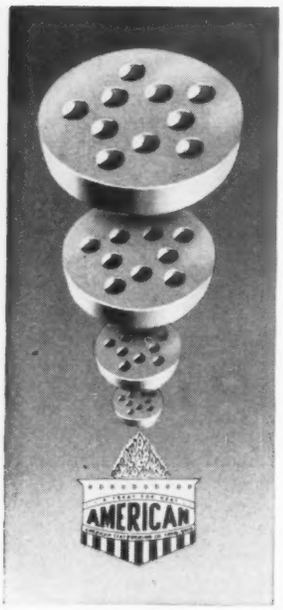
Write for Specification Bulletin "D"

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

CUT CORE-MAKING COSTS!

Use AMERICAN CERAMIC *Strainer Cores!*



No need to tie-up expensive coremakers' time with shop-made "skim cores" . . . just use economical, easy-to-handle American Ceramic Strainer Cores.

Speeds production too . . . and remember, American Cores assure you of slag-free castings EVERY time.

American representatives will quote prices on any size Strainer Core.

Write today for samples and descriptive literature.

AMERICAN CLAY FORMING COMPANY
TIFFIN, OHIO ★ TYLER, TEXAS
National Sales Representative
Williston & Company, Delta, Ohio

MANUFACTURERS OF SPECIALIZED REFRACTORIES FOR OVER 30 YEARS

BROWNING

HYDRO ELECTRIC BUCKETS

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1½ yd. capacity

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Ask for our Bulletin "F"

VRB

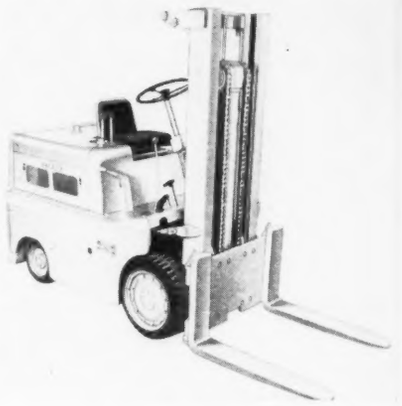
VICTOR R. BROWNING & COMPANY, INC.
Chagrin River Road
WILLOUGHBY (CLEVELAND), OHIO

(*Continued from page* 268)

clothes and other inflammable items. Any object of wood or fiber which is inflammable and has sufficient porosity can be flameproofed by spraying or pouring this solution on it so that the entire surface is treated or by dipping the object in the solution.

For More Details Circle No. 11—Page 269

Industrial Trucks: Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—Changes have been made in the company's 6000 to 7000-lb gas or electric powered industrial trucks. New trucks are highly maneuverable and have a turning radius well within the limitations of practical aisle widths. A new fork



mounting recommended by the Industrial Truck Association is standard on both models. "Free-lift" of 25 in. and more lift beyond that are provided by new upright design which does not increase upright height. The electric model's parking brake functions automatically when the driver leaves the seat. The gas powered model, pictured here, has a "quick-change" clutch to facilitate removal and replacement. A drive which operates without clutch or conventional transmission is optional. Travel speed of the electric model has been increased to 6 mph, and lifting speed is 12 to 16 per cent faster.

For More Details Circle No. 12—Page 269

Couplings: Lincoln Engineering Co., Natural Bridge Ave., St. Louis 20—A line of new hose couplings is equivalent in performance to swaged-on couplings, but with the advantage of being reusable. When the core of the hose is inserted in the sleeve, wire braid is flared and gripped between the shoulder of the stud and the shelf of the sleeve with great clamping force. The coupling speeds assembly by using a bell-shaped counterbore in the sleeve to eliminate difficulty in starting the hose into the coupling and to act as a screw by engaging the ends of the wire braid on the hose.

(*Continued on page* 276)

Hello, Young Voters!

You've taken this country as your birthplace.

You toddled around and laughed and grew under the sunshine skies of Liberty.

Your fathers and mothers put you to bed each night with the confidence of Freedom, not in furtive fear.

You learned in free schools.

You played ball or skated or jumped rope without a care in the world.

Your stomach was full, your clothes were warm, your roof was sound.

You enjoyed privileges and pleasures, movies and cars, treats and trips like no other youth growing up in the world ever did before.

Now you're of age.

You're full-fledged citizens.

Now it's your turn to pay with a little of your time and some of your thought for a lot of things you received when you were growing up.

The least you can do is to vote to help keep your country the way you want it, lest the children *you're* raising won't have the frank, free years you have had.

Be sure, Young Voters, you're registered!
Be sure, Young Voters, you vote!

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS"
SPECIAL PATTERN
ALUMINUM

Better Castings result when "FALLS" SPECIAL PATTERN ALUMINUM is used:

... more fluid than other aluminum alloys, it will run thin sections more readily.

... "top shrinkage" is eliminated—no soldering to build up depressed areas.

... since heavy gates and risers are not needed, much extra casting expense is eliminated.

... with only a trifle less linear shrinkage than other aluminum alloys, no change in the pattern scale for running No. 12 Alloy is needed.

... checking is rarely encountered.

WRITE FOR
COMPLETE DETAILS

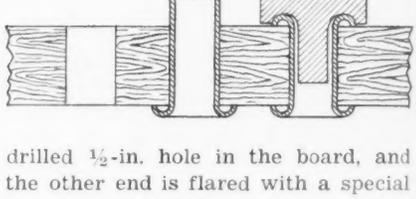
NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 23, NEW YORK

(Continued from page 274)

To speed up assembly even more, all couplings are notched to provide a gage line for skiving the outer cover of the hose to the correct length. An extra large flow-passage in the stud and the shorter overall length of the stud reduce restriction to a minimum. The end of the core is completely confined by metal to assure safe handling and leakproof performance. The couplings are zinc-plated steel.

For More Details Circle No. 13—Page 269

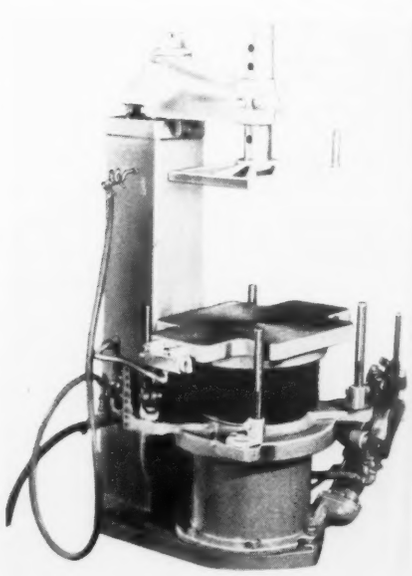
Pattern Board Bushings: Calumet Steel Castings Corp., 1636 Summer St., Hammond, Ind.—Easily attached bushings are intended to prevent the damage caused by a vibrator that is attached to a pattern board by bolting. The preformed resilient bushing, one end of which already is flared, is inserted through an ordinary



drilled ½-in. hole in the board, and the other end is flared with a special impact tool. This provides a reinforced hole for attaching the vibrator and is said to give good vibrating action to the pattern when the latter is drawn from the mold.

For More Details Circle No. 14—Page 269

Molding Machine: Johnston & Jennings Co., Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Jolt squeeze pin-

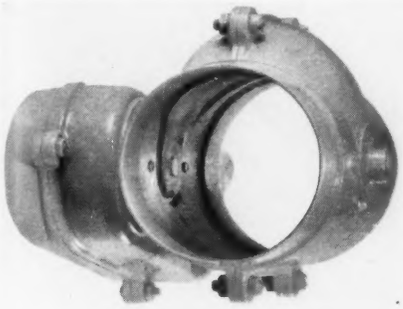


lift molding machine has concentric jolt, squeeze and pin-lift cylinders which make possible simplicity and ruggedness. The smallest of three

models which use the concentric design incorporates a 13-in. squeeze cylinder built around a 5-in. jolt cylinder, the pin-lift cylinder being built around the squeeze cylinder. The 6-in. draw is said to be extremely true and to stay true throughout the life of the machine because of the large cylinder bearing area. All models feature simplified controls for fast operation.

For More Details Circle No. 15—Page 269

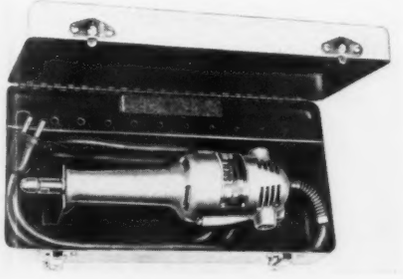
Air-Control Valve: Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11—Control valve for air exhaust systems opens and closes automatically as the switch of the grinding or woodworking machine on which it is installed is turned on and off. This prevents continual exhaust-



ing of warm air from the room when the machine is not operating. It also creates improved efficiency in the entire suction system because of the concentration of suction on only those machines actually operating. Lack of obstructions in the air passage when the valve is open eliminates the possibility of catching chips, dust, lint and shaving threads. Operation of the valve is mechanically controlled by a solenoid.

For More Details Circle No. 16—Page 269

Hand Grinders: Skilsaw Inc., 5033 Elston Ave., Chicago 30—Three hand grinders for use with mounted wheels and points are designed to meet the needs of tool and die departments, pattern shops and designers who need lightweight, maneuver-



able, powerful utility grinders. One model is equipped with a 5/32-in. capacity geared chuck and has a speed of 20,000 rpm The second and third models both come with ⅛-in. and ¼-in. collet chucks, but have speeds of 20,000 and 36,000 rpm, respectively. The first two models are designed for use with shank accessories of 1¾-in. diam and smaller. The third takes 1-in. and smaller shank accessories. All models are less than 10 in. long and weigh approximately 2 lb.

For More Details Circle No. 17—Page 269

Machining Supplies: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Narrow-width saw band combines positive rake angle for easier tooth penetration, hardened teeth for longer cutting life and retention of set and a flexible back. Designed to be replaced rather than reharpened or reset, it is available in widths from ¼ to 1½ in. and in pitches of 2, 3, 4 and 6, depending upon width. It comes in "strip-out" containers which hold 100 or 500 ft and in cut and welded lengths ready for immediate use. The same manufacturer offers a stick-type wax lubricant for use in machining, sanding,

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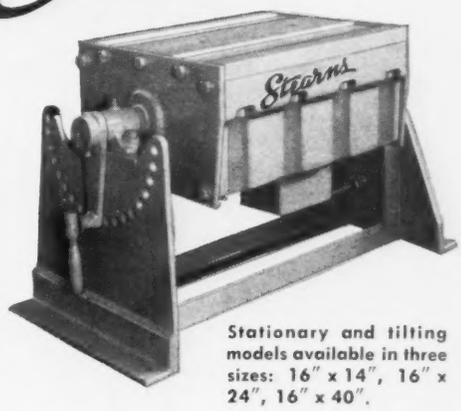
GRINDING
EFFICIENCY
WITH
Stearns

TIME-SAVER
GRINDER
HOLDING
MAGNETS



Stationary and tilting models available in three sizes: 16" x 14", 16" x 24", 16" x 40".

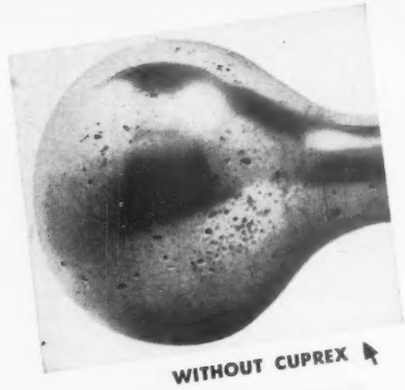
YES, here's the answer to new grinding efficiency. Use the STEARNS Grinder Holding Magnet — cut your grinding costs by reducing the set-up time and the grinding time. This means more production, too, for more work is done per man-hour. Easy to install and simple to operate, the STEARNS Grinder Holding Magnet holds all shapes of castings securely and safely. Eliminates the need for clamps, wedges and other devices normally needed for grinding castings.

Using STEARNS Grinder Holding Magnets means savings in dollars and hours, a saving in worker fatigue, and a definite improvement in safety practice.

- CUTS COSTS — Reduces production costs up to 30%.
- SAVES TIME — Less time required for chucking up.
- SAVES LABOR — Casting finished in less time.
- SPEEDS PRODUCTION —Production increases of 20% or more.
- ECONOMICAL — Low operating and maintenance costs.
- RUGGED — Sturdily constructed — made for tough work.

Foremost in the Magnetic Field
Stearns MAGNETIC INC.
662 S. 28th St., Milwaukee 46, Wis.

Which casting is YOURS?



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WITH CUPREX

the big difference is...

® FOSECO
FOUNDRY-TESTED
CUPREX
TREATMENT

for
brass, bronze and nickel alloys

IT'S BETTER 7 WAYS:

1. *Cleans metal*
2. *Removes gas*
3. *Improves lead distribution*
4. *Prevents zinc smog*
5. *Gives sound, pressure-tight castings*
6. *Improves physical properties*
7. *Reduces scrap — saves metal*

. . and it's safe, effective, simple, economical, scientifically sound.

CUPREX BLOCKS have been tested under all conditions — and found fully effective. They supply the means of applying the oxidation-reduction technique ensuring maximum density and minimum gas content in castings of copper and nickel alloys. Added at the beginning of the melting process, Cuprex Blocks develop an oxidizing atmosphere, degas the melt and slag impurities.

MAKE YOUR OWN TEST!

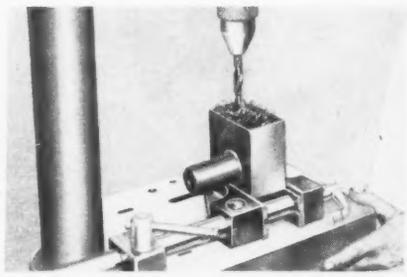
Write today for a trial order and complete information. If you have a special problem, tell us about it—we will be glad to help you.

FOUNDRY SERVICES, Inc.
280 Madison Ave., Dept. F
New York 16, N. Y.

grinding, polishing and forming operations. By reducing frictional heat, it helps to prevent scoring and loss of tool temper and improves work finish. It is available in 1 lb quantities in a push-out cardboard dispenser tube 11 in. long and 2 in. in diam. It is applied directly to the cutting edge of the tool or to the surface of the material to be machined.

For More Details Circle No. 18—Page 269

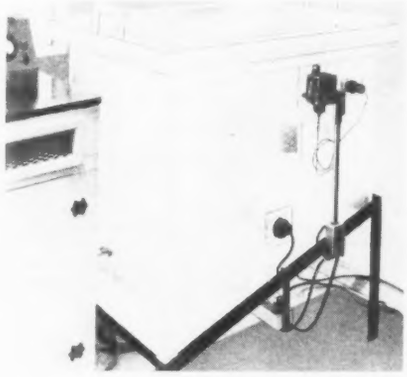
Safety Vises: Wahlstrom Float-Lock Sales Dept., American Machine & Foundry Co., 511 Fifth Avenue, New York 17—Safety vises lock



quickly in practically any position on drill press and band saw tables. The drill press model permits regular, end or angled drilling and acts as a jig when duplicate pieces are required or repeat assembly operations must be made. It turns over on three sides and swings out of the way when not in use. Maximum capacity is 8 in. The band saw model, with a 10-in. capacity, enables the operator to do all types of sawing without touching the material. The vise can be used to cut vertical pieces, compound and simple angles and irregularly shaped, hard-to-hold pieces and for automatic chain feed operation.

For More Details Circle No. 19—Page 269

Testing Cabinet: Singleton Co., 10516 Western Ave., Cleveland—Testing cabinet for "fog-type" spray testing of all ferrous and nonferrous



metals, organic and inorganic coatings, is said to be inert to all solutions and gases used in this type of

Fitted for Every Job Need

DIPPED NEOPRENE INDUSTRIAL GLOVES

SAFE—They can help prevent costly accidents. The rough-surface fingers assure positive, easy gripping. And Neoprene withstands gasolines, oils, greases and corrosive chemicals.

COMFORTABLE—The curved finger construction conforms to the natural curve of hand—eliminates straining and pulling. Highly flexible, they permit easy, natural working motions.

ECONOMICAL—They are built for long wear and tough service. Full range of sizes, lengths and weights. U. S. technical men will be glad to analyze your glove needs and recommend the correct glove for each of your jobs. Available from your nearest United States Rubber Company Branch.

U. S. INDUSTRIAL GLOVES

UNITED STATES RUBBER COMPANY

testing. Designed primarily for salt spray testing, it is light in weight for portability, transparent for observation and a good insulator for maintenance of accurate operating temperatures. Its atomizer operates on any plant air system, and the cabinet uses 110 v. Weight is approximately 160 lb; dimensions are 36 x 24 x 36 in. ID.

For More Details Circle No. 20—Page 269

Pocket Microscope: National Instrument Co., 5005 Queensbury Ave., Baltimore 15—A 50-power measuring microscope reads directly, on an engraved scale mounted in the

body tube, to 0.002-in. and permits estimations to 0.0005-in. About the size of a fountain pen, it has precision achromatic lenses, fully corrected for color and for spherical aberration.

For More Details Circle No. 21—Page 269

Mask and Shield: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32 — Featherweight plastic mask and cotton gauze filter protect nose, lungs,

face and eyes against nuisance dusts, chips and particles in all types of light, nontoxic work. The cotton and sanitary gauze filter pad is replaceable.

For More Details Circle No. 22—Page 269

Sand Blaster: Vacu-Blast Co. Inc., 350 Peninsular Ave., San Mateo, Calif.—Sand blaster quickly removes paint, rust and scale to furnish an ideal surface for painting, welding, metal spraying and bonded coatings. An air-operated filling valve elim-

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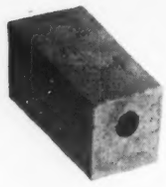

dependable slag-hole blocks

Operators of continuous pour cupolas report 20 or more hours steady service from CARBOFRAX silicon carbide blocks, with practically no change in hole size. These durable blocks constitute the best current answer on how to eliminate costly shutdowns due to slag hole failure.

Get a trial order and check up. For further data write Dept. V102, Refractories Div., The Carborundum Company, Perth Amboy, N. J.

Slag-hole blocks by

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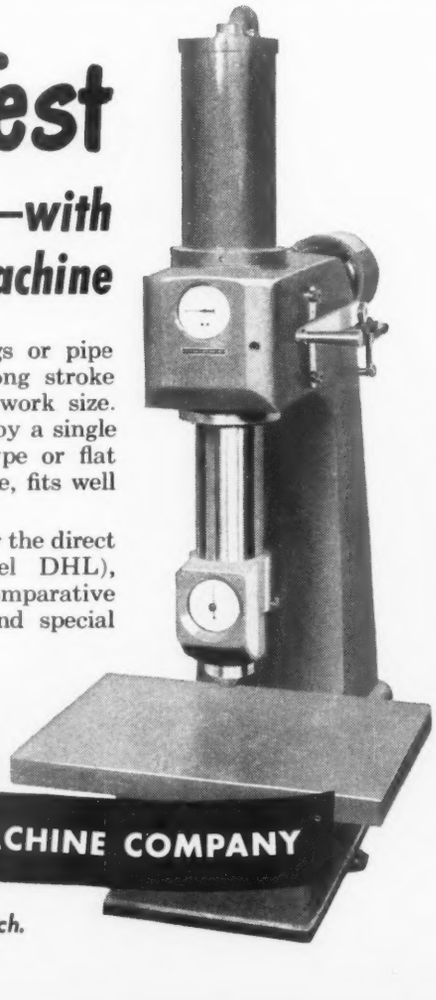
Brinell Test

large pieces fast—with this long stroke machine



Large awkward castings, forgings or pipe are easily tested because the long stroke eliminates screw adjustment to work size. The hydraulic ram is controlled by a single lever. Large, stationary roller-type or flat table makes work handling simple, fits well into a conveyor line.

Choice of plain Brinell machine or the direct reading machine (shown, model DHL), where dial at end of ram gives comparative hardness immediately. Larger and special machines may also be had.

Write for more information on all our Brinell testing machines.

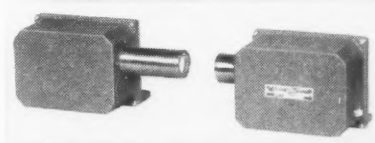
DETROIT TESTING MACHINE COMPANY

9390 Grinnell Ave., Detroit 13, Mich.

inates binding and obstruction, and a single, three-way valve operates the tank and blast lines. The entire top is dished to receive sand. Built of steel to conform to the ASME code, the tank tests to twice the normal operating pressure of 125 psi. Tungsten carbide nozzles are standard equipment.

For More Details Circle No. 23—Page 269

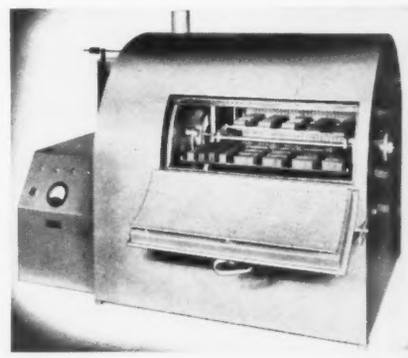
Controls: Autotron Co., Box 722-R, Danville, Ill.—Photo-electric controls give protection against light source or tube filament failure and provide tube warm-up protection, positive plate relay operation, positive-lock tube shields and rubber-based tube sockets. The light source



uses a two-filament lamp so that when one filament burns out, the circuit is automatically switched to the other and a built-in pilot light comes on to indicate that the lamp should be replaced. A safety relay in the photo-amplifier circuit will not close until the amplifier is warmed up and ready to operate. This relay opens automatically when a tube filament fails. The circuit positively energizes the plate relay with a very small change in light, assuring positive, dependable operation. Cast aluminum cases house both amplifier and light source. Tube shields have internal compression springs to hold the tubes firmly in place. Different case designs and types of light sources are available.

For More Details Circle No. 24—Page 269

Core Oven: Harry W. Dietert Co., 9330 Rozelawn Ave., Detroit 4—Large reel type core oven accommo-



dates up to 120 tensile specimens or five single cores 4 x 9 x 23 in. on five rotating shelves. Correspondingly large numbers of transverse

or cylindrical specimens may be baked at once. Cores may be loaded or removed during the bake. Less then 4° F temperature variation and vigorous circulation produce tensile tests usually within 5 per cent of the average and always less than 10 per cent from it, according to the manufacturer. The oven is furnished with a large humidity controller for incoming air and automatic temperature controller-indicator.

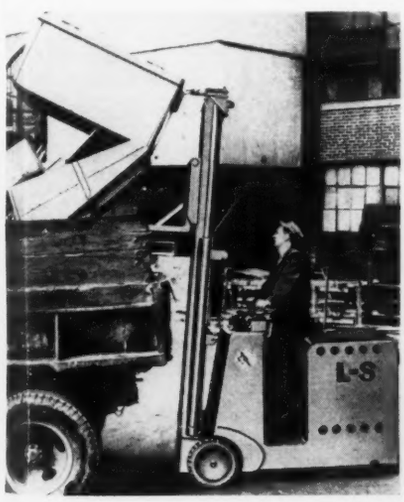
For More Details Circle No. 25—Page 269

Lamp Holder: Stonco Electric Products Co., 333 Monroe Ave., Kenilworth, N. J.—Weatherproof lamp holder uses a high temperature, silicon rubber cushion-seal to hug the neck of the lamp in a tight, weather-

proof seal which also helps to protect it against traffic vibration, pole sway, shock and other factors conducive to early failure. The unit is made of cast aluminum with a glazed porcelain, heatproof socket. The cushion-seal is backed with an impregnated asbestos heat barrier and locked in place by a rigid aluminum reinforcing disk. UL and CSA approval has been given the unit for use with medium base or mogul reflector lamps in standard 150, 200, 300 and 500 w sizes.

For More Details Circle No. 26—Page 269

Bins: Lewis-Shepard, Watertown, Mass.—All-steel tiering bins with



trap-door bottoms facilitate handling of almost any bulk material. A hook on top of the mast of a fork truck engages at any height desired. Then as forks are lowered over the chosen dumping spot, the bottom of the box opens while the hook holds the rest of the box in position. Contents of the bin flow out quickly and are deposited accurately. The bins nestle one on top of the other for tiering. They can be made to size specifications.

For More Details Circle No. 27—Page 269

Fan Blades: Kloppenborg Aluminum Foundry, 211 Marquette St., Davenport, Iowa—A 36-in., one-piece, cast aluminum fan blade has been added to the manufacturer's line, which now offers blades ranging from 12 to 36 in. Designed to increase air flow with either circulating or exhaust fans in industrial installations, these blades deliver from 1255 to 14,900 cfm of air. They are bored to electric motor shaft specifications.

For More Details Circle No. 28—Page 269

Bench Vises: Van Products Co., 3734-58 West Twelfth St., Erie, Pa.—Two high-powered, air-operated bench vises have a power ratio of 100:1.

FOX
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Three important reasons why FOX Grinders are designed as single-wheel machines:

1. Speed changes can be made at the proper wheel diameter.
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These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty—30" heavy duty.

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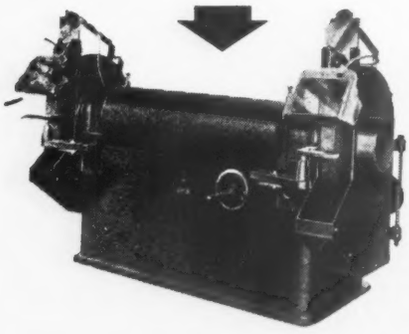

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Bradford Heavy Duty Snagging Grinders have an infinitely variable speed range to maintain a constant surface speed, *automatically* adjusted to wheel wear. Designed to give the correct grinding speed—9500 sfpm for Hi-Speed Wheels or 5500 sfpm for Vitrified Wheels — throughout the life of the wheel. No belts to move or gears to shift. Speed is adjusted while grinder is running. Increased useful wheel life will pay for this Bradford in a short time!

Available in 7½ to 30 HP. models with single motor and double spindle; double motor with two independent spindles.

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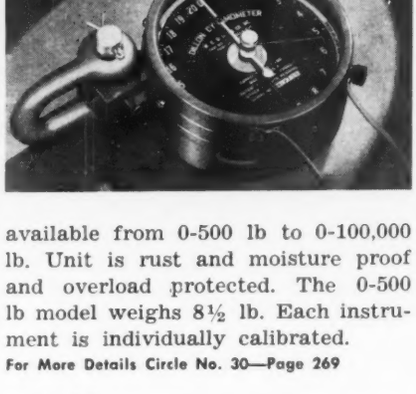
Manufacturers' Agents Wanted. Some Good Territories Open.

Power is furnished by a cylinder with an 8-in. bore and two pistons of 50 sq in. each, separated by a removable cylinder head. The single-acting cylinders incorporate a fully enclosed spring return. Piston stroke, and therefore jaw stroke, is 0-in. to 1⅜ in. maximum, controlled by a positive safety stop screw. These vises have jaws 6 in. wide with maximum openings of 10 and 11 in., respectively. One is available with stationary or swivel base, the other with swivel base only. Smooth jaw faces are available on both, and one incorporates heavy pipe jaws for all sizes through 6-in. Both require no adjustment and little lubrication.

For More Details Circle No. 29—Page 269

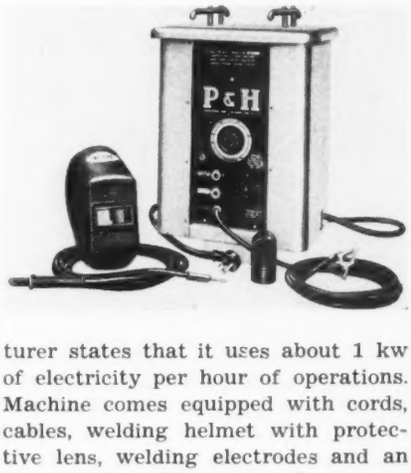
Dynamometer: W. C. Dillon & Co. Inc., 1421 South Circle Ave., Forest Park, Ill.—Traction dynamometer can be made to operate electrical warning signals, relays, motors, switches, etc. Thirteen capacities are



available from 0-500 lb to 0-100,000 lb. Unit is rust and moisture proof and overload protected. The 0-500 lb model weighs 8½ lb. Each instrument is individually calibrated.

For More Details Circle No. 30—Page 269

Welder: Harnischfeger Corp., 4400 West National Ave., Milwaukee 14—Limited type input welder possesses welding range from 20 to 180 amp. It is knob-controlled. Manufac-

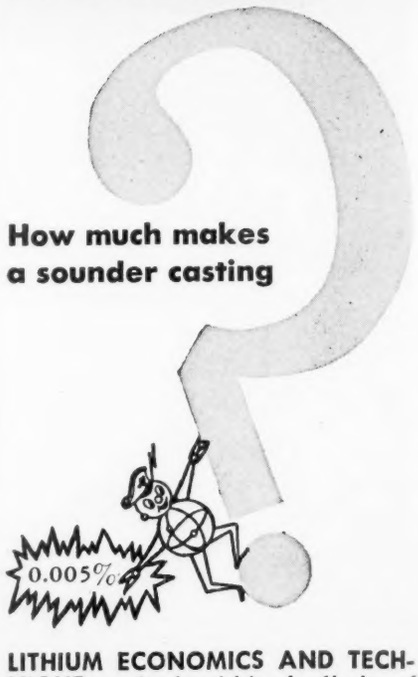


turer states that it uses about 1 kw of electricity per hour of operations. Machine comes equipped with cords, cables, welding helmet with protective lens, welding electrodes and an illustrated welding manual.

For More Details Circle No. 31—Page 269

LITHIUM:

How much makes a sounder casting



LITHIUM ECONOMICS AND TECHNIQUE are both within the limits of everyday nonferrous foundry operation. A small slug (0.005%) of metallic lithium added to a charge of molten copper effectively removes dissolved oxides and gases. End result is an improved, more uniform casting with better electrical conductivity. By adding Lithium the surer way—in the handier *cartridge* form exclusive with Metalloy—castings are sounder at less cost and less trouble.

Specifically, tensile strength and elongation are increased, porosity decreased, and grain size reduced. Characteristic low density causes the lithium products formed to float to the surface where they are easily removed as slag.

TESTS under production conditions in nonferrous foundries have long established Lithium in metallurgy as a degasifier, deoxidizer, desulfurizer and general purifying agent. As a degasifier of Nickel Bronze, for example, Lithium Cartridges make possible a dense, fine grained metal.

Lithium Cartridges eliminate the guesswork formulation too common with less satisfactory methods. Hermetically sealed in copper tubing, three convenient sizes include 2.25, 4.50 and 9.0 grams.

WRITE Dept. F for details of actual foundry tests. The small amounts of Lithium required put this revolutionary technique within *your* reach.

IF IT'S LITHIUM—IT'S METALLOY

LITHIUM CORPORATION of America, Inc.

METALLOY CORP., Division
Rand Tower
Minneapolis 2, Minnesota

Molding Green Strength

(*Continued from page* 109)

Arthur Watts, former professor of ceramic engineering at Ohio State University, described these theories as follows:

The Envelope Theory—This holds that each plastic clay particle is a hydrous silicate of alumina, of colloid size (less than 0.0001 mm diam) and enveloped in a film of water. If the water envelope is thick enough, the particles in the mass flow without pressure. The amount of pressure required to make the particles flow increases as the thickness of the water film decreases. If the film breaks, the clay particles come into contact with one another, and the mass is not plastic—that is, it cannot be molded. This theory assumes two divisions of the water and the clay mass: The envelope water which surrounds each particle of clay and the interstitial water which fills the cavities between the envelope particles.

If the amount of water is reduced in the plastic clay, the thickness of the envelopes will first be reduced. As long as the water envelopes are intact, the clay will be plastic. When the reduction of water causes the envelope to break at any point, the mass cracks in molding, evidencing lack of lubricating material.

The envelope water is the shrinkage water. The interstitial water apparently has no influence on the physical properties of the body; therefore when water is added to a dried clay the first few per cent produces little physical effect. Likewise, when the water is dried out of the clay, the last portion of water to be removed is the interstitial water.

This theory undoubtedly functions and has value.

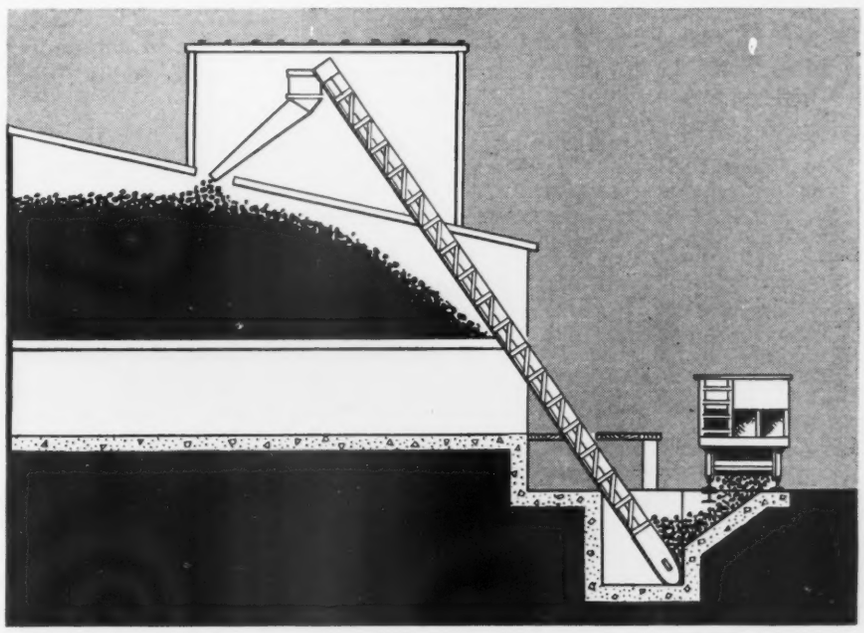
The Colloid Theory—This theory holds that plasticity is due to the state of extreme subdivision of the clay particles, which permits them to move on one another with minimum frictional resistance and also causes the mass to display a bond which is proportional to the degree of fineness of the material. Bentonite provides an excellent example for this theory.

A. S. Cushman of the U. S. Department of Public Roads claims that any other material as finely divided as clay possesses bonding power and other evidence of plasticity. He pulverized feldspar and quartz and claims to have developed plasticity in them. Water is, of course, necessary to prevent the mass of particles from wedging.

One in a series of factual reports from owners of Farquhar Conveyors

FARQUHAR CONVEYOR UNLOADS COKE 75% FASTER*

* Hardinge Manufacturing Company, York, Pa.



THIS conveyor installation, planned, designed and installed by Farquhar at Hardinge Manufacturing Company, unloads a car of coke in just 8 man-hours . . . a job that formerly required 32 man-hours. That means sizeable savings in time, labor and demurrage penalties!

Whether you move coal, gravel, sand, aggregates, cartons, boxes, bundles, bales, or any kind of bulk or packaged materials—horizontally or from floor to floor—Farquhar can cut *your* handling costs to rock bottom! One or more of the complete line of Farquhar portable, semi-permanent, and permanent conveyors will solve your handling problem. Our engineers will be glad to consult with you . . . at no obligation!

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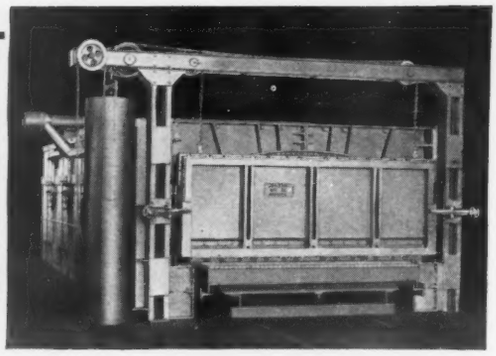

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Particles must be approximately spherical to move on one another with minimum friction. If water is present during the grinding process, the particles will roll on one another, wearing off all corners and produce spheres. Importance of shape of grain as well as size is recognized by all investigators. This theory therefore involves fineness primarily, but also requires approximately spherical particles.

The smallest diameter grain visible under an ordinary microscope is 0.001 mm. The diameters of colloid particles range from 0.0001 to 0.000001 mm. A crystalloid is 0.0000001 mm and finer. A colloid was formerly considered to be amorphous, but acceptance of the size of grain idea permits crystalline material to be also classed as colloidal. Colloid particles do not become a constituent part of a solution. The smallest colloid is called a "sol." The other colloidal state, which consists of a group of particles or a conglomeration of sols, is called a "gel." The particles of a sol operate independently of all other particles, for reasons which are disputed. One reason given is that the particles have contracted and thus forced all the water out of their structure. An old theory claims that a gel is an expanded sol. The sol state is sometimes called the dispersed state and the gel system the coagulated system.

The action of acids and alkalies on colloidal material in clay is termed "electrolytic." If an alkali is added to a colloid, particles are dispersed; however, if an excess of alkali is added, the particles may again attract one another, or flocculate together. The Acheson process deals with clay treated with tannic acid to make it more plastic. Prior to the development of this process, clays were aged in wooden cellars, the clay taking up the tannic acid while standing and thereby becoming plastic. It was formerly thought that the clay aging was required, but now the same effect is produced by placing clay in concrete bins and adding a little tannic acid to make it plastic. Aging time is much shorter. Because acid added to most clays makes them very sticky, it is sometimes applied in mold washes. Acid also stabilizes an alkali clay.

This theory has a recognized value.

Combined Water Theory — This theory assumes that clays are made up of hydrates $Al_2O_3 \cdot 2H_2O + SiO_2$ and $SiO_2 \cdot 2H_2O + Al_2O_3$.

The water of combination or crystallization can all be driven off at about 450° C. and at that temperature the clay loses all of its plastic

properties. Most dehydrated clays have a waxy feel which gives them a molding but not a bonding property. An objection to the theory is that although kaolins contain more hydrates than ball clays and should therefore be more plastic, according to the theory, they are not. Furthermore *two clays of identically the same composition do not possess the same plasticity.* Clays such as fireclay and bentonite must not be compared directly.

Organic Theory — This theory assumes that plasticity is due to the decay of organic or vegetable matter associated with the clay in the deposit and to the development of humus and humic acid through the action of water. The humus provides a sticky material, and the humic acid probably contributes to the flocculation of colloidal clay particles, thereby rendering the clay more plastic. This theory is sometimes acclaimed for naturally bonded sand and has merit.

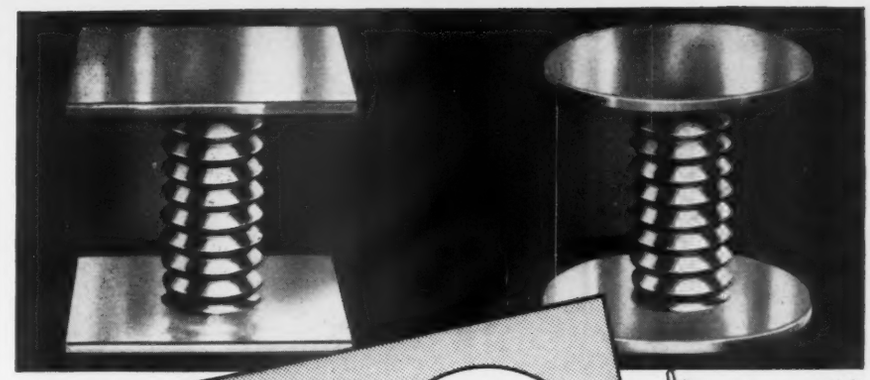
The Bacterial Theory—This theory assumes that bacteria present cause a fermentation of clay and liberate H_2S, the odor of which may become very offensive in clay aged for a long time. The fermentation of the hydrogen sulphide contributes to the flocculation of the clay and increases its plasticity. This action is recorded in clays which are too low in vegetable matter to account for increased plasticity because of the amount of humus present. However, in most cases humus and bacteria are associated in clays. Fermentation can sometimes completely ruin a clay-sand mixture, such as certain steel sands with high cereal content. This mixture may turn "sour" and then become "very brittle" to mold. The change in pH value should be studied. This theory, too, has merit.

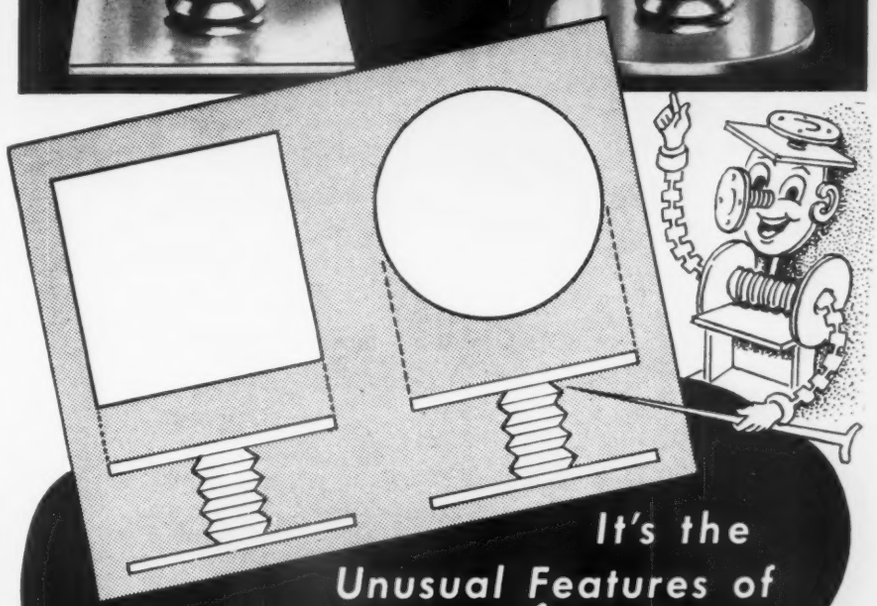
The Alkali Theory—This theory assumes that the plasticity is due to adsorbed alkalies. Ball clays and bentonite are very high in adsorbed salts (about 2 to 4 per cent), chiefly of potassium and sodium. This theory is not generally accepted because the addition of an alkali to a clay does not always improve the plasticity.

The Hexagonal Plate Theory — A kaolinite mineral is in the hexagonal plate form. The water between the plates stops them from tearing apart, but permits them to slide. This is a poor theory.

The relative importance of the different theories will probably never be agreed upon.

Conclusions—The ceramic theories about why "plasticity" or "green strength" are developed may shed





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light in future approaches. Facts are difficult to obtain in this problem since what may be true about a fireclay, may not be true about bentonite. Such clays as the illites or the halloysites are certainly different from both of the above. Even different deposits of the same clay mineral may be greatly different in physical properties. Nevertheless, further investigations and more specific co-operation between foundrymen and their suppliers can help to develop better and improved materials.

The foundryman is strongly interested in the control of "green strength" or "plasticity," whichever it may be called, but as yet our direct methods of testing for this property are not entirely satisfactory since the indirect methods are not as reliable as the direct methods of testing.

The foundryman uses the direct measurement of the strain produced by given stresses at molding consistency. This stress-strain relationship is measured in terms of "green compression strength," "green tensile strength" or "green shear strength." The test which resembles the actual operation is considered the best.

References

1. Wilson, Hewitt, *Ceramics-Clay Technology*, McGraw-Hill Book Co. Inc.
2. Bancroft, W. D., *Applied Colloid Chemistry* (1926), p. 183.
3. Ries, H., *Clays—Occurrence, Properties and Uses*, John Wiley & Sons.

Book Review

Design Manual for the Repair of Aluminum Alloy Structures, edited by Howard M. Jensen, paper, spiral bound, 208 pages, 6 x 9 in., published by Johnson Research Corp., Bethpage, L. I., N. Y. Price $3.50.

Practically every conceivable repair that would ever need to be made on an aluminum alloy structure is covered in detail by this book, including skin repairs, casting repairs, extrusion and rolled section repairs and tubing repairs. Each repair has been designed accurately and stress analyzed.

Section I of the book contains general information concerning types of damage and reviews accepted methods for their detection and analysis. The emphasis is on the practical rather than the theoretical approach.

Succeeding sections offer comprehensive data, illustrations and examples of repair problems. The discussion on castings repair covers preparation of edges, cleaning, preheating, use of flux and welding procedure. A description of standard fasteners with specifications, sizes, weights, materials, AN numbers and an appendix of useful information in the form of mathematical tables, solutions of formulas and equations are included.

...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 269

GLOSSARY: International Nickel Co. Inc., Dept. EZ, New York 5—A glossary of terms for producers and users of iron castings, this 36-page booklet explains over 150 technical terms that are used in common by suppliers and users of ferrous and nonferrous castings. Should prove useful to the designer, machinist and purchaser of castings as well as to the man in a foundry.
For More Details Circle No. 100—Page 269

PYROMETERS: Assembly Products Inc., Main at Bell St., Chagrin Falls, O.—Bulletin G-3 lists and describes pyrometers for panel mounting and portable use. The complete listing of the company's products shows nine temperature ranges covering from minus 200 to plus 3000° F and the corresponding Centigrade ranges from minus 130 to plus 1650°, as well as tables showing the internal and external resistance of each range.
For More Details Circle No. 101—Page 269

INDUSTRIAL NOZZLES: Binks Mfg. Co., 3122 Carroll Ave., Chicago 12—Bulletin 5200 provides a wide range of information concerning spray nozzles for metal cleaning, bonderizing, spray quenching, gas washing and similar industrial applications. An index lists 29 different applications for industrial spray nozzles with page reference for each. Request a copy on company letterhead.
For More Details Circle No. 102—Page 269

INDUSTRIAL TRUCKS: Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—New edition of *Material Handling News*, the company's magazine, tells the story of the firm's engineering and production, its technical counsel to customers and prospects and its worldwide service setup. Also listed are 14 of the company's sound motion pictures, with information about how they may be procured on a loan basis.
For More Details Circle No. 103—Page 269

FOUNDRY EQUIPMENT: Grindle Corporation, 16231 Turner Ave., Markham, Ill.—Folder discusses the personnel and organization of the corporation and lists some of the foundry equipment it produces, such as charging systems; melting equipment; dust, fume and smoke control equipment; pulverized fuel, oil and gas firing equipment; pneumatic conveying system and heat treating ovens.
For More Details Circle No. 104—Page 269

COMBUSTION SAFEGUARDS: Selas Corp. of America, Philadelphia 34—Bulletin SC-1006, describes two protective devices used in the piping systems of gas and air combustion systems to detect, localize and extinguish a flashback close to the burners. Principles of operation, design and construction are covered in detail. The device is designed for installation in any of six positions, four horizontal and two vertical. This facilitates piping arrangement to make best use of available space.
For More Details Circle No. 105—Page 269

HACK SAW BLADES: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Bulletin 50-823 describes the company's complete line of blades for use on hack sawing machines and for hand hack saw frames. It gives information about hack sawing operations, and a "speed and feed" chart for cutting different materials is included.
For More Details Circle No. 106—Page 269

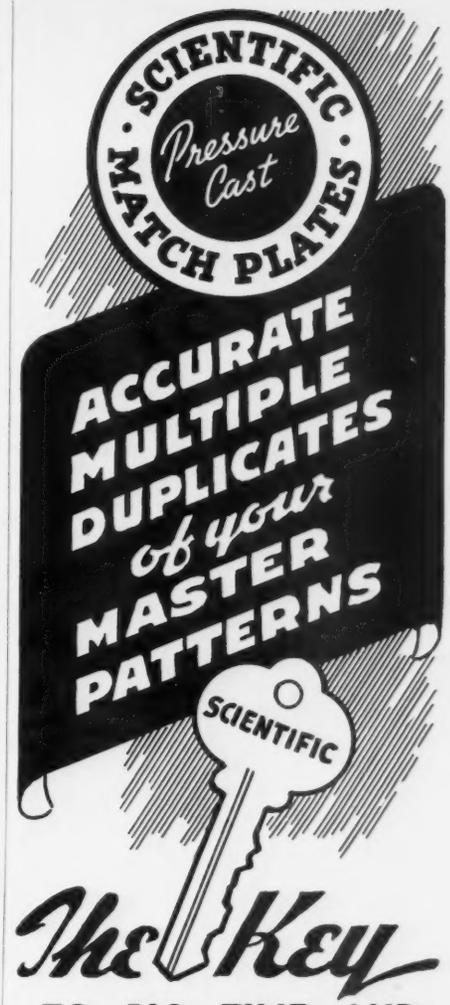
CERIUM: Cerium Metals Corp., 153 Waverly Place, New York 14—Complete text of "The Harmful Influence of Some Residual Elements in Magnesium-Treated Nodular Cast Irons and Their Neutralization by Cerium" by H. Morrogh is available without cost to anyone in the United States who indicates his professional status when making his request.
For More Details Circle No. 107—Page 269

IMPREGNATING EQUIPMENT: Process Industries Engineers Inc., 5640 Friendship Ave., Pittsburgh 6—Bulletin 51-B describes company's vacuum pressure impregnating system and explains its operation. The bulletin also contains information on impregnating electrical equipment, metal castings, leather and textiles, lumber and other materials.
For More Details Circle No. 108—Page 269

GAS BURNER NOZZLES: Hauck Mfg. Co., 124-136 Tenth Street, Brooklyn 15, N. Y.—New catalog 804-C covers the latest enlarged line of gas burner nozzles for industrial heat processing applications. Capacities and other data are given on ten sizes of straight, and nine sizes of elbow type nozzles now available. Spark and gas pilot ignition are explained.
For More Details Circle No. 109—Page 269

MATERIALS HANDLING: C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5—Pictorial catalog 104 presents materials handling equipment for coreroom, foundry, cleaning room and miscellaneous systems.
For More Details Circle No. 110—Page 269

VERTICAL GRINDERS: Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23—Special features of the latest model vertical grinder described and illustrated in catalog 40 include magnesium castings; steel wearing plate on front of grinder; two positions either 90 or 110 degrees for



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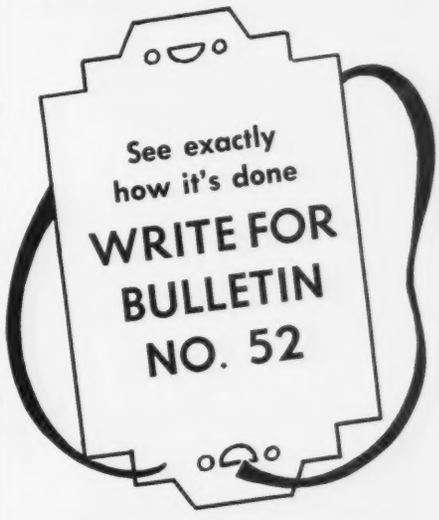

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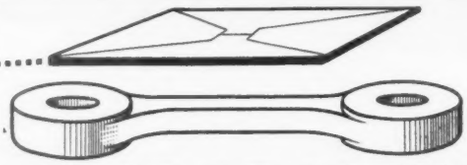

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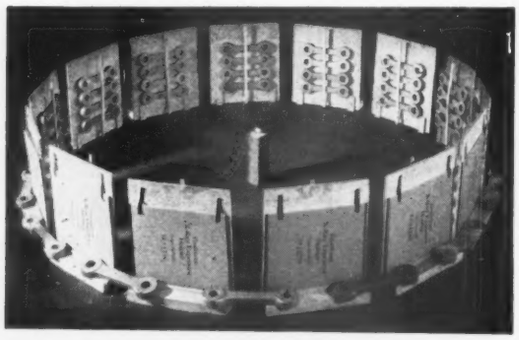

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For More Details Circle No. 111—Page 269

RAIL EQUIPMENT: Manufacturers Equipment Co., 242 Madeira Ave., Dayton 4, O.—Bulletin 5 illustrates and describes power-driven transfer cars and tractors, also narrow gage turntables. The cars are furnished with storage battery, trolley line, or gasoline engine drives. Tractors are equipped with battery or engine drives. Vehicles have convenient controls, dependable brakes, chill rim wheels, heavy duty bearings, rugged construction.

For More Details Circle No. 112—Page 269

MAINTENANCE RECORDS: Remington Rand Inc., 315 Fourth Ave., New York 10—Folder KD-705 describes in detail how a system of records schedules and controls machine inspections and maintenance operations with a minimum of paperwork. It also outlines how an allied system shows all essential facts about the machines and equipment of an organization.

For More Details Circle No. 113—Page 269

X-RAY EQUIPMENT: Westinghouse Electric Corp., Box 2099, Pittsburgh 30—Folder B-4787 describes the seven following types of x-ray equipment: single column tubestand unit, industrial jib crane unit, ultra high-speed radiograph unit, mobile unit, equipment for mass inspection of parts, wall-mounted industrial x-ray unit and thickness gage.

For More Details Circle No. 114—Page 269

PNEUMATIC CONVEYORS: Gerwin Industries, Michigan City, Ind.—Folder describes pneumatic pipeline system for moving foundry sand. Sand is moved anywhere in foundry or coreroom through 4-in. pipes, by compressed air. One man operates entire system by pushbutton control from a central operating panel.

For More Details Circle No. 115—Page 269

HEAT TREATING: Ajax Electric Co. Inc., Frankford at Delaware Ave., Philadelphia 23—Bulletin 123-B discusses 17 ways in which submerged electrode salt bath furnaces can increase metal heat treating efficiency on ten specific heat treating applications in the temperature range from 1100 to 2400° F.

For More Details Circle No. 116—Page 269

RADIANT PANELS: Edwin L. Wiegand Co., 7596 Thomas Blvd., Pittsburgh 8 — Illustrated six-page bulletin CS-605 explains how the new infrared generator can be used for paint baking, curing, drying, degreasing and other operations. The panels produce an unvarying radiation in a longer far-infrared wave length

that is efficiently absorbed by all colors of material. Built-in essentials include fully insulated alloy infrared element, 5-ply thermal insulation, continuous 100-amp bus, and structural steel frame.
For More Details Circle No. 117—Page 269

CONTROLLERS: Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Wayne & Windrim Aves., Station 213, Philadelphia 44—Bulletin 1501 describes new strip chart program controllers used for automatic regulation of time-temperature control programs in metal processing and other industries.
For More Details Circle No. 118—Page 269

HEATING UNITS: Prat-Daniel Corp., South Norwalk, Conn.—Catalog NGC-10-52 features a full color, cutaway illustration of one of the company's direct-fired heating units and illustrates various other models with both photographs and line drawings. Specifications and dimensions of all models are listed.
For More Details Circle No. 119—Page 269

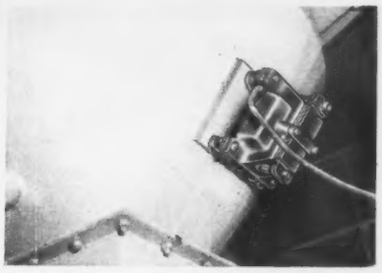
CRANE EQUIPMENT: Harnischfeger Corp., Overhead Crane Division, Milwaukee 46—Bulletin C 5-1 desecribes complete line of electrical equipment designed for overhead crane service. Every item from crane control to current collectors is presented and explained by text, photographs, charts, and drawings.
For More Details Circle No. 120—Page 269

MATERIAL HANDLING: Smith Devices Inc., 331 North Fourth St., Philadelphia 6—Bulletin 100 describes the company's material handling devices. Clamps for lifting plate vertically and horizontally are illustrated and discussed, together with other equipment in the line. Request a free copy on business stationery.
For More Details Circle No. 121—Page 269

PEARLITIC MALLEABLE: Belle City Malleable Iron Co., Racine Steel Castings Co., Racine, Wis.—Folder 12 of the company's iron and steel series calls attention to the 17th anniversary of the firm's brand of pearlitic malleable and summarizes briefly its characteristics and physical properties.
For More Details Circle No. 122—Page 269

HYDRAULIC TOOLS: Blackhawk Mfg. Co., Milwaukee 1—Book shows how hydraulic tools can solve production, construction, maintenance and other problems. Its 64 pages include large photos and brief descriptions of ideas developed and applied by hundreds of users of the company's hydraulic products.
For More Details Circle No. 123—Page 269

CONVEYOR BELT: May-Fran Engineering Inc., 1692 Clarkstone Rd., Cleveland 12—Four-page illustrated catalog MF-530 describes and presents specifications on the recently developed hinged-steel belt, recommended for handling metal scrap, hot forgings, flash, wet or dry metal chips and turnings, and other sharp or abrasive material. Belt can be as-



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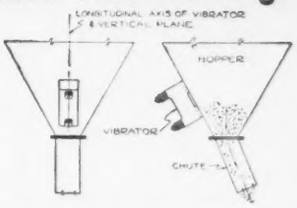

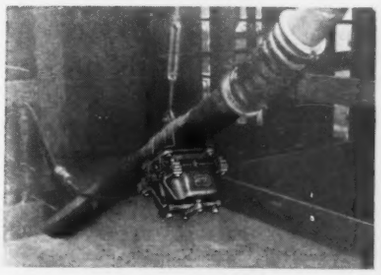

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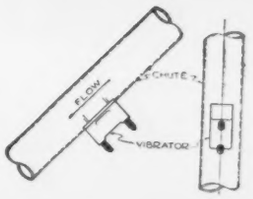

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For More Details Circle No. 124—Page 269

CONVEYOR BELTS: Barber-Greene Co., Aurora, Ill.—Bulletin describes company's conveyor belts and pictures and discusses such major causes of belt failure as ply separation, carcass deterioration, irregular plies, edge wear and longitudinal seam failure.
For More Details Circle No. 125—Page 269

LIFT TRUCKS: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Bulletin 525 presents information concerning one-man hydraulic lift trucks for handling heavy skid and box loads. It discusses three standard models and gives their complete specifications.
For More Details Circle No. 126—Page 269

CORE BAKING EQUIPMENT: Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.—New specification sheets feature descriptive data, design particulars, photographs, dimensions and other types of information about the company's core baking equipment.
For More Details Circle No. 127—Page 269

BUCKET LOADER: National Engineering Co., 549 West Washington Blvd., Chicago 6—Bulletin 485A describes the company's bucket loader, which is designed to speed handling of foundry sand. Design specifications, space requirements and other descriptive data are also included.
For More Details Circle No. 128—Page 269

MOBILE CRANES: Coles Cranes Inc., P. O. Box 942, Joliet, Ill.—Two folders give general descriptions and specifications of 15,000 and 24,000 lb full circle slewing mobile cranes. These gasoline-electric, one-man-operated cranes are designed expressly for industrial materials handling.
For More Details Circle No. 129—Page 269

RADIOACTIVITY EXPOSURE: Tracerlab Inc., 130 High St., Boston 10—Pamphlet details the operation of an inexpensive weekly film badge service for the measurement of personnel exposure to radiation from radioactivity, x-ray or radium.
For More Details Circle No. 130—Page 269

FOUNDRY RIDDLES: Great Western Mfg. Co., Leavenworth, Kans.—Folder describes specifications and use of various types of gyratory foundry riddles. It illustrates different sizes and kinds of riddles for screening molding and core sands.
For More Details Circle No. 131—Page 269

PHOSPHOR COPPER: Ajax Metal Division of H. Kramer & Co., Frankford Ave. & Richmond St., Philadelphia 23—Compact booklet explains how to improve brass and bronze melting practices through proper use of phosphor copper. The main effect of phosphorus as an added element is to lower the melting point, to widen

freezing range and fluidity, to increase tensile strength and resistance to compression, and to lower the pouring temperature. Each of these features is treated individually in detail.

For More Details Circle No. 132—Page 269

CORE OILS: Archer-Daniels-Midland Co., Foundry Products Division, 2191 West 110th St., Cleveland 2—Booklet describes seven core oils produced by the company and, with the aid of graphs and tables, gives information about their performances with various types of sand, different baking times and in conjunction with cereals.

For More Details Circle No. 133—Page 269

ABRASIVE DISKS: Gardner Machine Co., Beloit, Wis.—Book of 60 pages contains information concerning abrasive fundamentals, selection, types of abrasives available, standard markings, spindle speeds, coolant selection, dressing, safety, grinding of various materials and care of disks.

For More Details Circle No. 134—Page 269

EQUIPMENT: Syntron Co., Homer City, Pa.—Catalog 525 provides pertinent data in condensed form on the entire line of equipment manufactured by the company. Its products include bin vibrators, vibratory feeders, weigh feeders, screening feeders, conveyors, packers, jolters, paper joggers, concrete vibrators, gas hammer paving breakers, rock drills, tie tampers, electric tools, rotary shaft seals, selenium rectifiers and diesel pile hammers.

For More Details Circle No. 135—Page 269

INDUSTRIAL HOSE: Thermoid Co., Trenton, N. J.—Pamphlet describes five color-coded, multipurpose hose types which replace the 18 hose types offered formerly. The new publication gives details of construction, sizes, lengths, pressures, recommended couplings and uses for the new hose line.

For More Details Circle No. 136—Page 269

COUPLINGS: De Laval Steam Turbine Co., Trenton 2, N. J.—Bulletin 2200 describes the company's flexible coupling and gives complete data, including information on construction, horsepower ratings, speeds, applications and selection.

For More Details Circle No. 137—Page 269

SAFETY: Cleco Division, Reed Roller Bit Co., 5125 Clinton Drive, Houston 20, Tex.—Free copies of a safety poster depicting the dangers of not using guards on grinders are available to interested companies. Size is approximately 13 x 17 in.

For More Details Circle No. 138—Page 269

ATLANTA, GEORGIA: Industrial Bureau of Atlanta Chamber of Commerce, Atlanta, Ga.—New edition of "Facts in Figures About Atlanta" reflects the growth and development going on in that region.

For More Details Circle No. 139—Page 269

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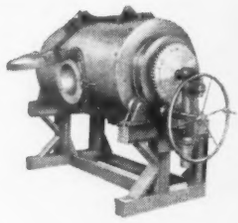

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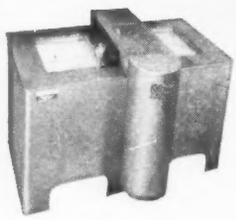

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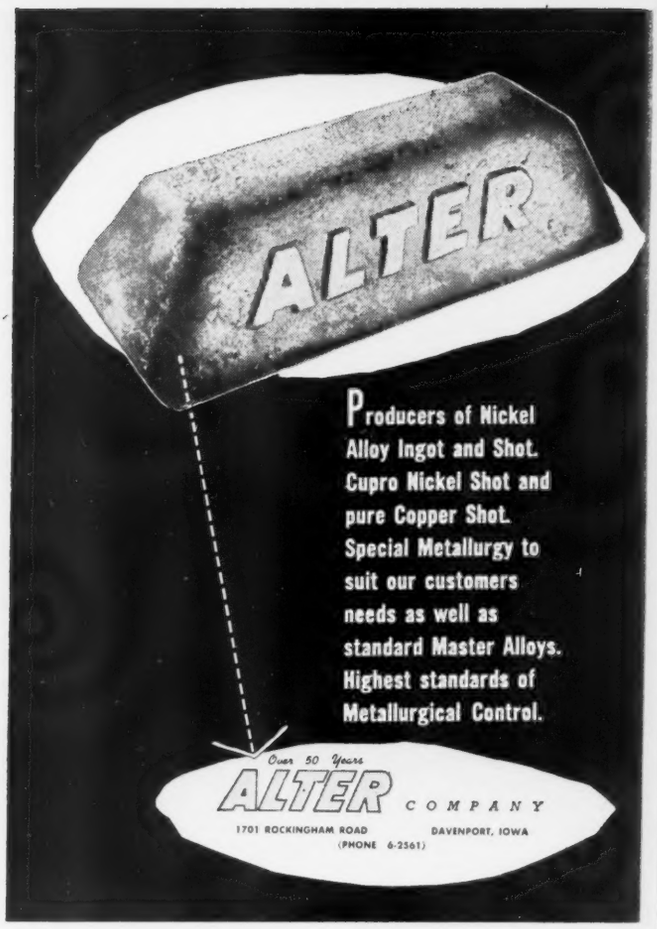
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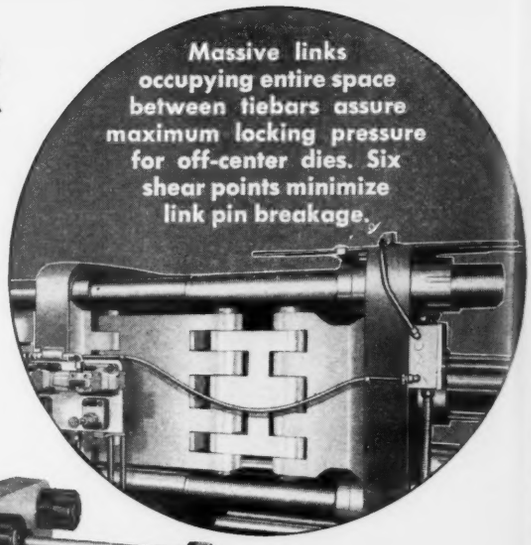

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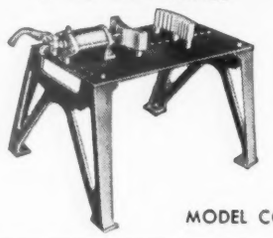

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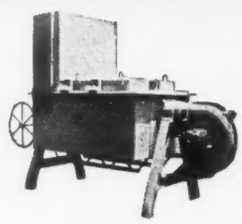
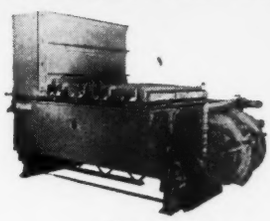
OLIVER BUILDING • PITTSBURGH 22, PA.

SUPERIOR PERFORMANCE



400 Series



1000 Series

Reda Stack-Loading melting furnaces for ferrous and non-ferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer, uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly.

Write or phone for complete details.

	CHARGE		MELT CAP./HR.	
SERIES	IRON	BRONZE	IRON	BRONZE
400	400#	450#	800#	1350#
550	550#	625#	1100#	1875#
1000	1000#	1125#	2000#	3375#
2000	2000#	2250#	4000#	6750#

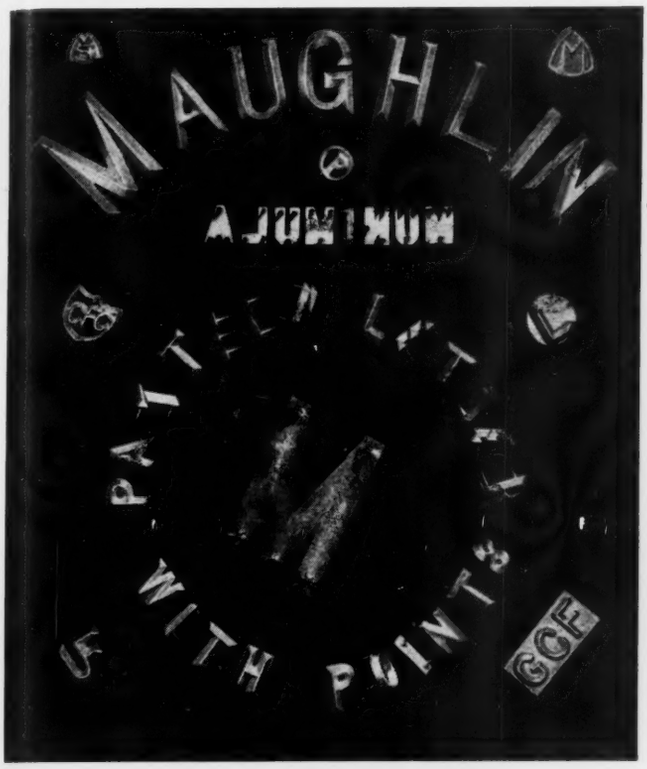
LARGER MODELS ON REQUEST

STACK LOADING
DIRECT FIRED—REFLECTING TYPE

REDA FURNACE

REDA PUMP CO. Bartlesville, Okla.

A Hammer Blow Secures Letters To Pattern



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953 Ingleside Ave., Columbus, Ohio
Manufacturers of letters and numbers exclusively for over 30 years

Master Power
HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
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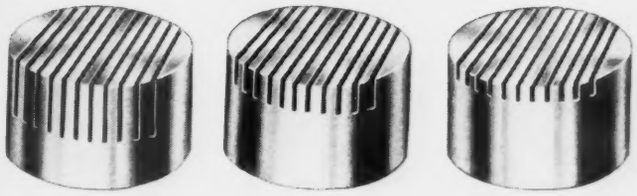
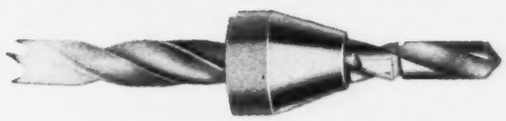
ANNOUNCING
PRICE REDUCTIONS
SMILLIE
CORE BOX VENTS
"A Specific Type for Every Core Box"
Slotted



X-TRA DEEP HEAD	DEEP HEAD	SHALLOW HEAD
.156 Wide Slots .014	.093 Wide or Narrow Slots .014	.031 .010

INSERTING DRILL



MOST ECONOMICAL METHOD
for
INSERTING CORE VENTS
• **Uniformity of holes** • **Faster insertion of vent**
• **Correct Depth**

VENT CLEANER

For Cleaning Slots
made of tempered steel, strong and easy to use.

MANUFACTURERS OF PRECISION MACHINED-GROUND PARTS TOOLS-GAGES-FIXTURES

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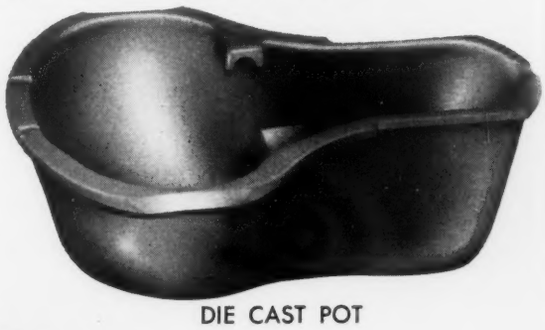
TOOLS • PRECISION SCREW MACHINE PRODUCTS • FIXTURES

MELTING POTS—Ingot Molds

FOR NONFERROUS METALS FROM ACME SPECIAL FORMULA

SPOUT POT
NO. 550A



DIE CAST POT

HOLDING BOWL
NO. HP7001

WRITE FOR
SCHEDULE OF 40 SIZES

ACME FOUNDRY COMPANY

2502 22nd Street **DETROIT 16, MICH.** *Phone:* Tashmoo 5-2404

A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON JISCO

A "blend" with JISCO is sound metallurgy.

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO

TERRE HAUTE
SPECIAL
FOUNDRY COKE

★

A QUALITY PRODUCT

Sold Exclusively by
REPUBLIC COAL & COKE CO.
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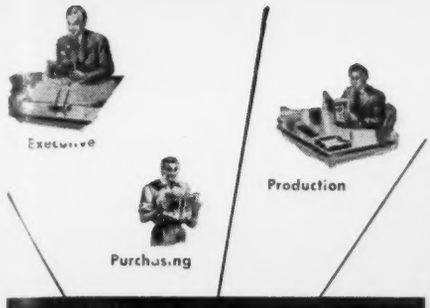
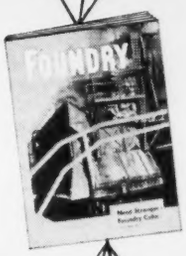
BRANCHES: Peoria • New York • Indianapolis • Milwaukee • Minneapolis • St. Louis
Detroit • Cleveland • Cincinnati

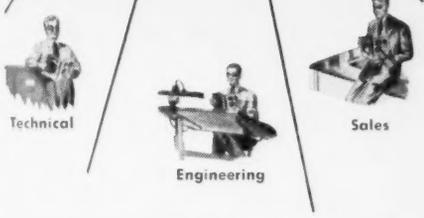
Manufactured at Terre Haute, Indiana by INDIANA GAS & CHEMICAL CORPORATION



45,000 Foundrymen Read FOUNDRY



FOR NEWS OF THEIR INDUSTRY



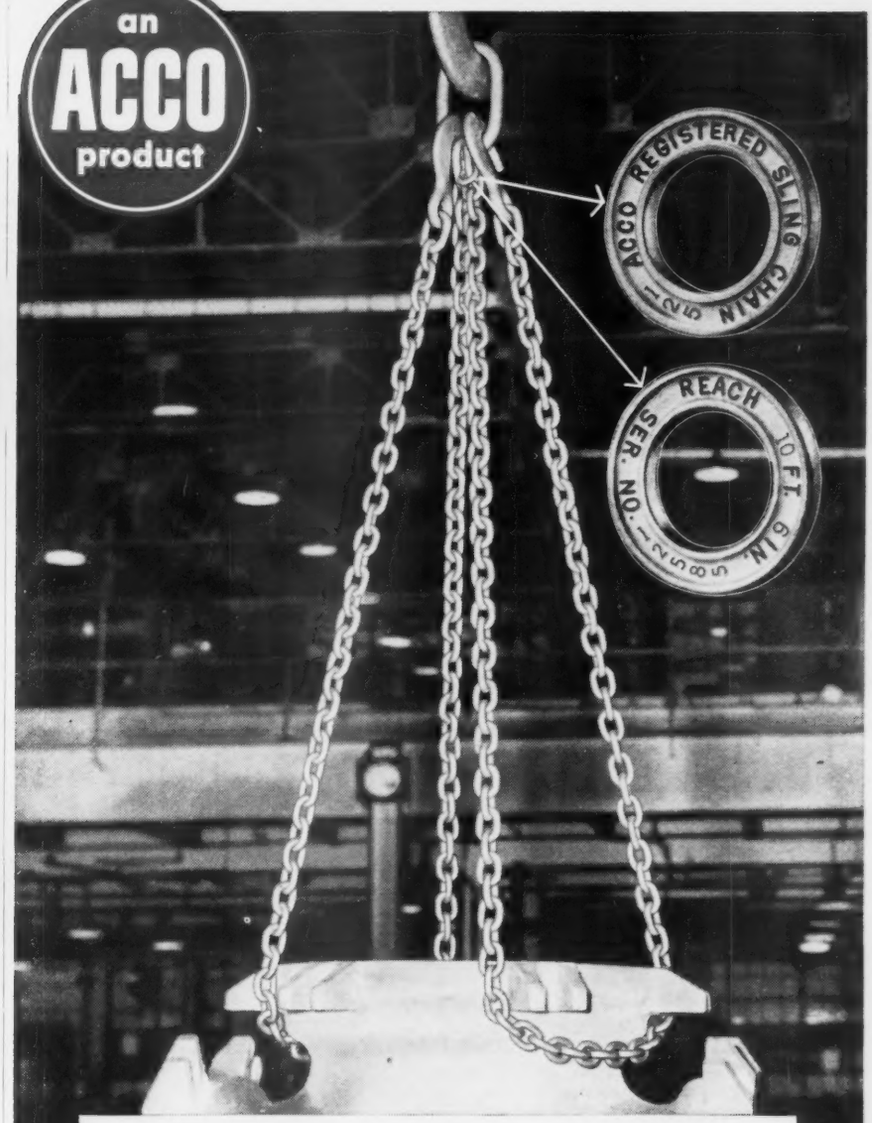
It's easy to understand why when you realize that nowhere else can foundrymen find *so much* news about the foundry industry. FOUNDRY's editorial staff concentrates on the job of keeping foundrymen up-to-date on developments in Washington, and in the financial and industrial centers as they affect the foundry industry. Their alert reporting and timely features have helped make FOUNDRY the most influential publication in this field by providing foundrymen with facts, figures and information they can depend on. This high reader interest—cover-to-cover readership among *45,000 foundrymen*—gives your advertising the *world's biggest audience of foundrymen* every month.

NBP CCA

FOUNDRY

A Penton Publication
Penton Building
Cleveland 13, Ohio

an **ACCO** product



ACCO Registered Sling Chains are Versatile

● Here an ACCO *Registered* Sling Chain is used in a double basket hitch. It could also be used as a two-legged bridle, or as a double choker. The tough 125 Endweldur ACCALLOY Chain is much lighter in weight and is easy to handle. It has great service life. The permanent identification ring on every ACCO *Registered* Sling Chain is your sign of safety and guarantee of quality.

See your AMERICAN CHAIN distributor. He'll show you how easy and economical it is to choose and use the best sling chains made.

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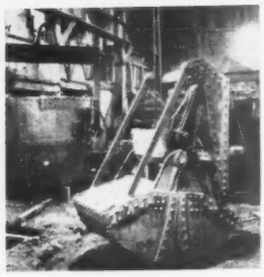
American Chain

These Four BLAW-KNOX *Buckets*

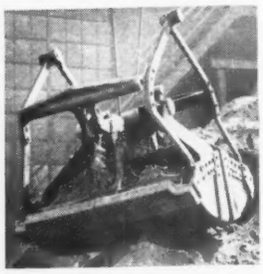
Help Solve Your Rehandling Problems for Average or Unusual Conditions

FOR AVERAGE HEADROOM



THERE is a type and size of Blaw-Knox Single-Line Hook-On Foundry Buckets to meet a wide range of operating conditions. Blaw-Knox can best give you the competent engineering service that makes possible selection of the bucket suited to your needs.

FOR EXTREMELY LOW HEADROOM



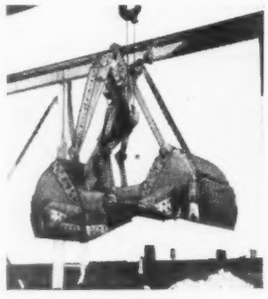
THIS Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾ yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

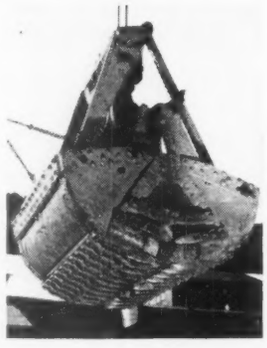
FOR COKE AND SAND

"Shark Tooth" Single-Line Hook-On Buckets

HERE'S the answer to the problem of handling coke and sand . . . simply by adding or removing liner plates, the *same* dual purpose Blaw-Knox Bucket handles both, with minimum degradation of coke and without sand leakage! The illustration at the upper right shows an open head type Single-Line Hook-On Bucket, rated 1 cubic yard, with liner plates applied inside of the shark teeth for handling sand, coal, small limestone and granular fines. Illustrated at the right is a closed head type 1 cubic yard Shark Tooth Bucket without liner plates for coke handling.

Blaw-Knox Shark Tooth Buckets are available in a wide range of sizes and for different headroom conditions.





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BLAW-KNOX DIVISION
of Blaw-Knox Company
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New York • Chicago • Philadelphia • Birmingham
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BLAW-KNOX
FOUNDRY BUCKETS

HAUCK OIL AND GAS BURNING EQUIPMENT

for
CUPOLA LIGHTING
MOLD DRYING
LADLE HEATING
CORE BAKING
FURNACE HEATING

Compressed air portable oil burner equipment for lighting cupolas and drying molds. Also hand pump types.

Venturi compressed air "suction" hand torches — no preheating, for drying linings, cores, molds.

Portable venturi high pressure oil burners with adjustable burner stand for heating and drying ladles.

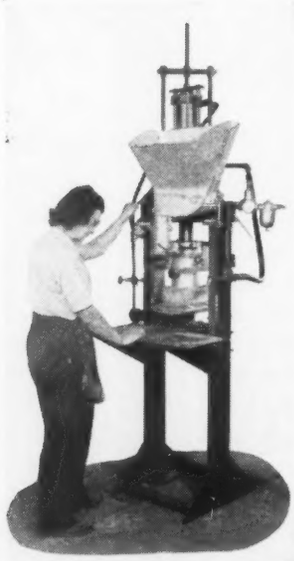
Featuring
Portable Ladle Heating High Pressure Oil Burners

This simple, safe, rugged, economical equipment with single or double venturi high pressure air type oil burners, adjustable stands, steel truck and fuel tank is available for heating ladles from 500 to 10,000 lbs. capacity. Enthusiastic users state it cuts drying time up to 80%. Write for Hauck Foundry Equipment Catalog—free.

HAUCK MANUFACTURING CO.
106 Tenth St., Brooklyn 15, N. Y.

Venturi low pressure and high pressure air atomizing oil burners for ladle heating, core and mold ovens, melting and annealing furnaces.

WESCO CORE BLOWER for SHORT or Long Runs



Small Foundry saved 25% of cost in first month of operation

Large Range— from smallest core to 6# in weight.

No channeling

Uses a minimum of air

Automatic sand filler

Air Chuck optional

You need this core cost cutter. Write for Bulletin "F"

WESTERN HDWE. & SPECIALTY MFG. CO.
3830 No. Fratney St., Milwaukee 12, Wis.

SHAKE OUT DECKS

Rebuilt with:

MANGANAL

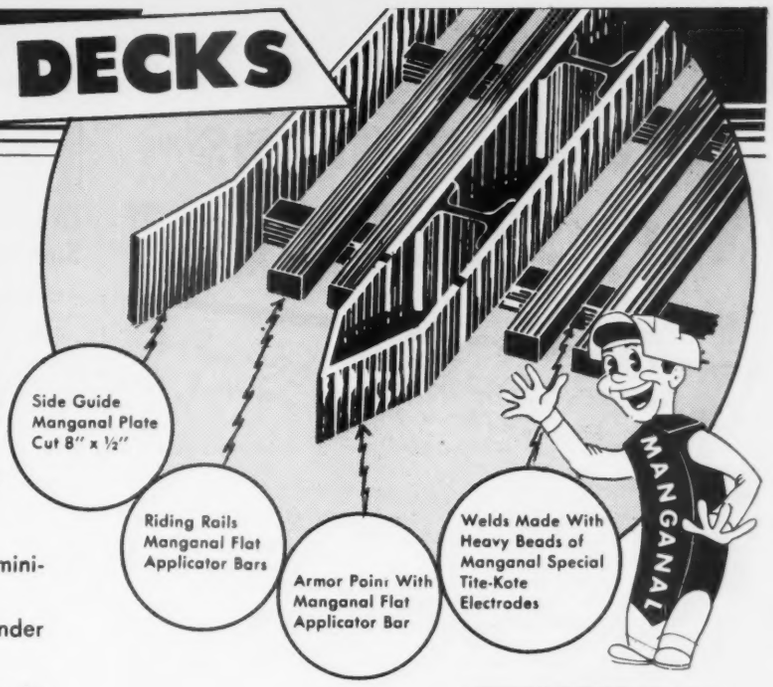
U.S. Patents 1,876,738-1,947,167-2,021,945

11% — 13½% Manganese-Nickel Steel

. . . Cuts Maintenance Costs

. . . Far Outlasts New Decks

- MANGANAL is the toughest metal known — minimizes wear from impact and abrasion.
- MANGANAL workhardens up to 550 Brinell under impact and abrasion, giving it longer life.
- MANGANAL has a tensile strength of up to 150,000 p.s.i. Eliminates breakage.
- MANGANAL saves time — saves money — speeds repairs.


Side Guide Manganal Plate Cut 8" x ½"
Riding Rails Manganal Flat Applicator Bars
Armor Point With Manganal Flat Applicator Bar
Welds Made With Heavy Beads of Manganal Special Tite-Kote Electrodes
MANGANAL

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Literature on latest methods for speedy and economical repair of worn equipment.

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SOLE PRODUCERS 92 N. J. RAILROAD AVE., NEWARK 5, N. J.

COLOR YOUR CORE SANDS

Modern foundries have found it practical to color their various grades of core sands. This eliminates guesswork and assures the proper use of the required type of core sand for the particular job at hand.

Our laboratories have developed a line of special dyes in a range of colors that have been carefully tested and found suitable as well as economical.

Write us for details and samples.

EATON CHEMICAL AND DYESTUFF COMPANY

1490 Franklin Street Established in the year 1838 **Detroit 7, Michigan**

Canadian Branches: Windsor and Toronto

PRECISION CORE BOX VENTS

You can depend on the quality that is built into every Demmler Core Box Vent. All orders are promptly filled from stock.

SLOTTED VENTS

(Available in Brass or Steel)

Slot Widths: .010", .013", .015"

Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8" 1", 1¼", 1½"

STAINLESS STEEL SCREEN VENTS

Mesh: #30, #40, #50

Diameters: 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1¼", 1½"

ILLUSTRATED FOLDER ON REQUEST

Wm. DEMMLER & Bros.

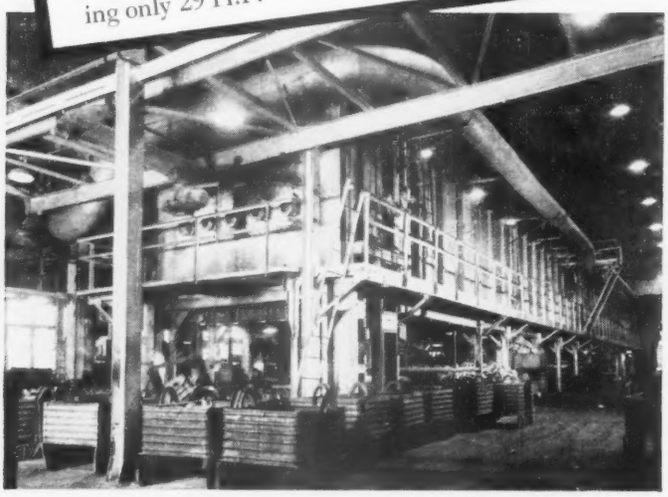
Kewanee, Illinois

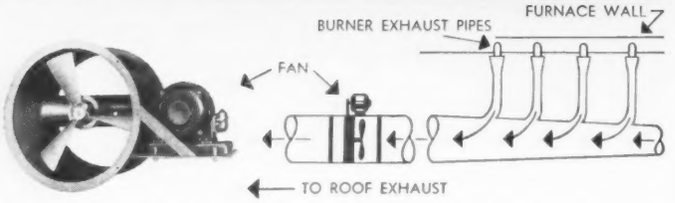
INTERNATIONAL HARVESTER SAYS:

Propellair Fans "Very Satisfactory"

PROBLEM—To exhaust 196° combustion products from 222 burners in 8 radiant tube annealing furnaces.

SOLUTION—A unique exhaust system using 9 Propellair Fans with total CFM of 70,607, requiring only 29 H.P.





■ Engineers for the McCormick Works of International Harvester in Chicago accomplished a neat trick in using a minimum of ductwork and only six 24" and three 30" ventilating fans in an exhaust system for 8 radiant tube furnaces.

Propellair Belt-Driven Fans (with motors outside airstream) were selected because of their record for exhausting explosive fumes with safety and efficiency. These fans have now been in continuous operation for 2 years—24 hours a day, 7 days a week. International Harvester says "results have been very satisfactory and maintenance at a minimum."

What's Your Ventilating Problem?

Propellair specializes in industrial fans designed for specific ventilating requirements. Propellair features include cast aluminum airfoil propellers, curved entrance rings, R&M *"All-Weather"* motors, certified air deliveries. Qualified sales engineers are available for consultation without obligation.

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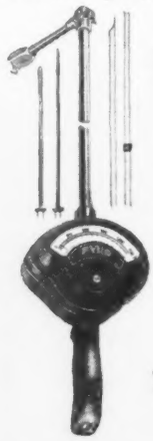
DIVISION OF ROBBINS & MYERS, INC.
SPRINGFIELD · OHIO

Measure Foundry Temperatures Accurately . . . at a glance!

Use the Simplified PYRO Optical Pyrometer

Any operator can quickly determine temperatures of minute spots, fast-moving objects and smallest streams with the simplified PYRO Optical Pyrometer. Completely self-contained—no calibration charts or accessories needed. An accurate, DIRECT-READING instrument that will pay for itself many times over by helping prevent spoilage. Weighs just 3 lbs. Available in 5 ranges (1400° to 7500° F.) *Write for FREE CATALOG #80, today!*

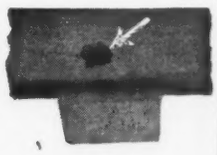


For Non-Ferrous Foundries . . . the PYRO IMMERSION PYROMETER

Helps insure low-cost production of SOUND, UNIFORM Castings. Has shielded steel housing which is shock-proof, dust-proof and moisture-proof—withstands roughest handling. "Protected Type" and "Bare Metal" thermocouples are instantly interchangeable, without adjustment or recalibration. Large 4-inch easy-reading dial. Equipped with exclusive LOCK SWIVEL. Available in 6 ranges (1000°F to 2500°F). *Write for FREE Catalog #150*

THE PYROMETER INSTRUMENT CO.
New Plant & Lab.
Bergenfield 6, New Jersey

3 Shades FOR A CLOSE MATCH with YOUR castings



When you true up surface blemishes in iron and steel castings with Smooth-On No. 4 Foundry Cement, you can make a close match in color and texture. For light colored, fine grained castings use Smooth-On No. 4AA, which will also take a machined finish. For medium gray metal choose No. 4A. For dark gray, coarser grained pieces you'll find Smooth-On No. 4B a match. Experienced foundry men use Smooth-On Foundry Cements regularly to fill in harmless but disfiguring sand and blow holes, pock-marks, porous spots and small dents. If your supply house hasn't Smooth-On No. 4 Foundry Cements, write us.

FREE Sample and Handbook

Write for free trial sample—specifying shade you wish to try. We'll send also the famous 40-page Smooth-On Handbook of time-saving, money-saving repairs made with various Smooth-On Iron Cements. Send NOW.

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Do it with **SMOOTH-ON FOUNDRY CEMENT**

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For low cost cleaning

- AMASTEEL is the blast cleaning material that is engineered for the job.
- AMASTEEL assures the lowest cleaning cost.
- AMASTEEL lasts many times longer. Investigate!
- AMASTEEL provides peak efficiency in shot for blast cleaning and peening. Developed by the maker of "PEENBLAST", "CLEANBLAST" and "ALLOY 99".

Abrasive for any and all kinds of work.

PRODUCERS OF
PEENBLAST
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ALLOY METAL ABRASIVE CO.

311 WEST HURON ST. ANN ARBOR, MICH.

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

PENN BUCKETS

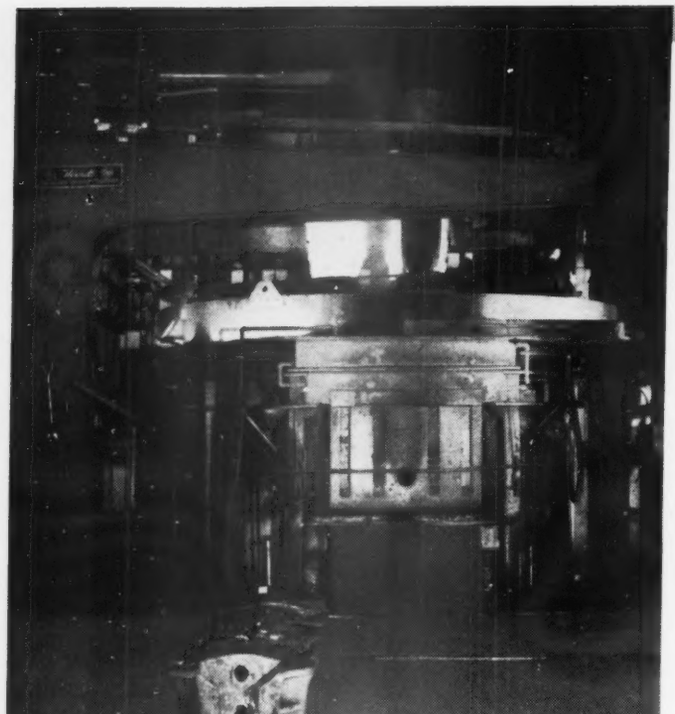
No. 4-A
Self Dumping

Careful balancing makes Penn Buckers self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

PENN IRON WORKS, INC.

READING, PENNA.



Heroult

ELECTRIC MELTING FURNACE

. . . as ever, the dependable furnace for the production of high-grade stainless, alloy and rimming steels.

Removable roof of new design now available for the larger furnaces.

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL COMPANY

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AMERICAN BRIDGE

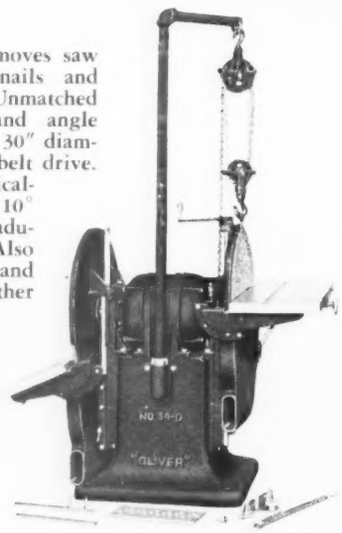
USS

UNITED STATES STEEL

"OLIVER" PATTERN MAKERS DOUBLE DISK SANDER

. . . sands circles and angles, large and small . . . nails and all!

Smooths end grain, removes saw marks, sands down nails and screws in patterns. Unmatched for accurate circle and angle sanding. Has two disks 30" diameter. Motor-in-head or belt drive. Tables adjustable vertically, tilt 45° to outside, 10° to inside. Accurate graduations and indicators. Also furnished as a Disk and Spindle Sander. (Other sizes also offered.)



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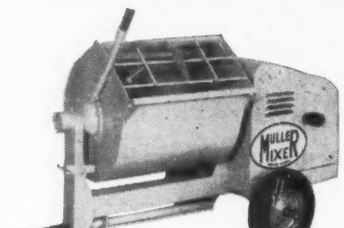
OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICH.

MAKE BETTER CORES FASTER at less cost— with a MULLER Core Sand MIXER



3 cubic foot capacity—mixes 250-300 lbs. per batch. Every foundryman knows that better cores mean better castings. This new, labor-saving core sand mixer will pay for itself in a short time. Without it, your core room costs are higher than they should be.

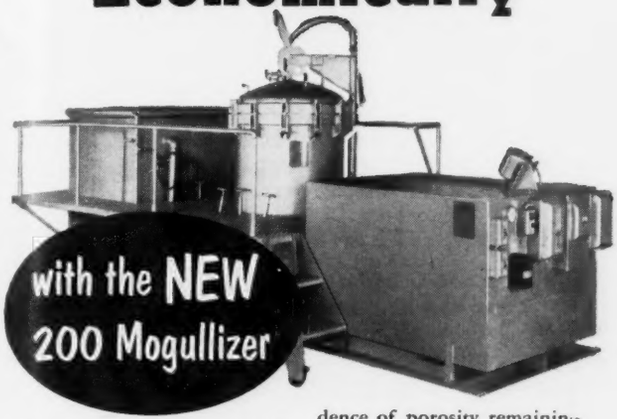
PRICE: $344 complete with 1½ H. P. electric motor ready to plug in, FOB Metuchen, N. J.

This mixer is available in a 6 cubic foot size, also.

MULLER MIXER

MULLER MACHINERY COMPANY, Inc.
Metuchen 14, N. J. Cable Address: MULMIX

Impregnate
PRESSURE CASTINGS
Economically



A positive, low-cost method of impregnating pressure castings to meet the most rigid specifications. Pressure castings impregnated with this equipment have been successfully subjected to severe tests with hot kerosene, hot oil, hot water and other solutions under pressure, with no evidence of porosity remaining.

Meets All Contract Specifications

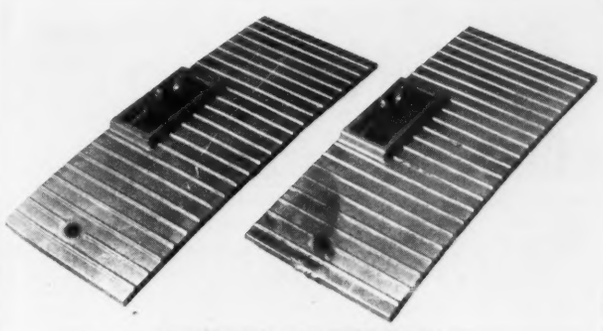
If your contract calls for casting impregnation, get the facts on this MOGULLIZER packaged plant which utilizes both pressure and vacuum stages.

Write today for free literature and recommendations for your casting salvage problems.

NOTE: There are job shops in certain areas who can take care of your contract work. A few territories are still open for job shop installation. Write for set-up plan today.

METALLIZING CO. OF AMERICA

Dept. F, 3520 W. Carroll Ave., Chicago 24, Ill., Telephone: SAcramento 2-3710



Prepare Your Molds With . . .

Mabco STAR FACING

Reduce Scabs and Buckles

Reduce Cleaning Costs

With heap sand and STAR FACING you can now obtain a better finish than is possible with many expensive, specially prepared sand facings.

Mabco STAR FACING is a PURE WHITE non-carbonaceous shake-on powder for use with any type green sand, gray iron molding. Shake on mold — No further preparation is necessary.

Write today for information on this money saving item

M. A. BELL COMPANY

Dept. AS, 217 Lombard St., St. Louis 2, Mo.

Offices in:
HOUSTON ST. LOUIS DENVER

"Serving the Foundry Industry for over 25 years"

Use Self-Dumping Containers

Save 50% Labor-Time

with

ROURA Self-Dumping HOPPERS

Imitated by Many— Not Equaled by Any

—they pay for themselves

Only ROURA Has The Exclusive PATENTED Instant Release Handle

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

—Can Be Coated With Acid-Resistant Paints

Write today for detailed brochure, "In Dollars & Sense."

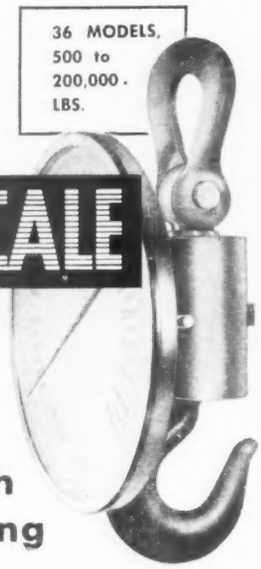
ROURA IRON WORKS, Inc.

1417 Woodland Ave. Detroit 11, Mich.

How much do you weigh?

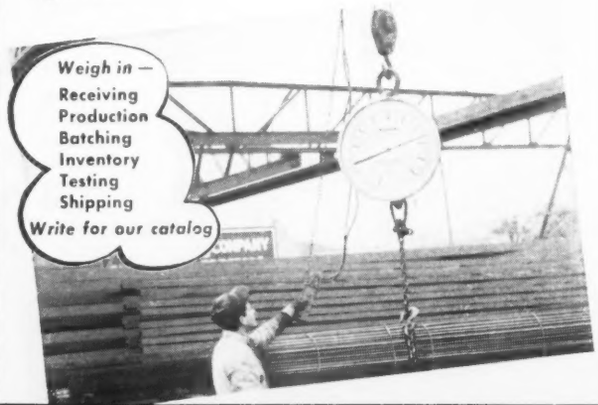
Not you, but your products! Do you weigh in receiving, at production stages, etc. to protect your operation against overcharges, losses, miscalculations? HYDROSCALE, the hydraulic crane scale, makes it practical to check whenever and wherever you should, weighs on the spot, eliminates weighing stations and man power and equipment tie-ups.

36 MODELS, 500 to 200,000 LBS.



HYDROSCALE

reduces the effort and expense associated with routine weighing jobs

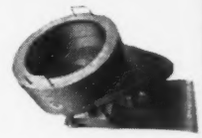


HYDROWAY SCALES, INC.

20630 W. 8 Mile Rd., P. O. Box 4754, Detroit 19, Mich.

CENTRIFUGAL CASTING MACHINES

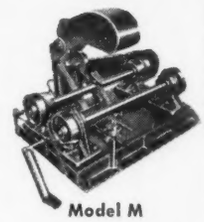
Model AS



Model J

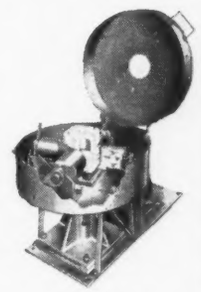
These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.



Model M

Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.



Model J-P

CENTRIFUGAL CASTING MACHINE COMPANY

Nathan Janco, *President*

P. O. Box 947 — Tulsa 1, Okla.

Reduce Use of Chills in Gray Iron Casting

Now all you have to do to get hard chilled iron is add

TELLURIUM

Comes in 1, 2, 3, and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 16-page article on the use of TELLURIUM in chill control.

American Smelting and Refining Company

120 BROADWAY • NEW YORK 5, N. Y.

. . . Just pull the trigger WITH THE MURPHY PISTOL SPRAYER

and the HAMILTON SPRAY GUN

$10.00 F.O.B. Hamilton, Ohio

Complete with a 4½ ft. length of suction hose and sinker. For spraying molds and cores with liquids, for cleaning motors and machinery, for laying dust, for spraying hot roofing materials, and many other uses. Trigger control, guaranteed.

Just pulling the trigger of the MURPHY PISTOL-SPRAYER shoots a stream of blackening into inner pockets that could never be reached by the old-fashioned brush or swab method. This sprayer was designed by a practical foundryman and now it is widely used for cleaning permanent molds, for aluminum and other metals, and also for sand-blasting.

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

Also a complete line of products designed to banish moisture from all kinds of air compression systems — Aftercooler, Separators, Filters, Traps, and Regulators.

Write for descriptive literature.

Over a million sold to date

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AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
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HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

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GAS, OIL AND ELECTRIC
FURNACES
For all annealing and heat treating requirements
THE ELECTRIC FURNACE CO. • SALEM, OHIO

TUMBLING BARRELS
Roller Bearing throughout
Direct Motor Drive with Speed Reducer
V Belt Motor Drive—Tight & Loose Pulley Drive
ROYERSFORD FOUNDRY & MACHINE CO.
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FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

CONSULTANTS

Reduces Casting Rejects!

SAND PACKS SOUNDER BECAUSE OF OPEN HEAD

Cleveland Coil Head Shoulder Radiator Chaplet

A chaplet cannot hold cores firmly unless it is held rigidly. The Open Head of this chaplet enables you to back sand better under head and around the stem.

Write For Bulletin

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Cleveland 22, Ohio

Patented

We also make
MOTOR CHAPLETS
BOILER CHAPLETS,
FORGED HEAD CHAPLETS,
FITTED HEAD CHAPLETS,
DOUBLE HEAD CHAPLETS,
and other types.

CLEVELAND *Chaplets*
Since 1890

Buehler

HAND GRINDERS

for fine grinding of metallurgical specimens

No. 1410

No. 1415 for flat sheets of abrasive paper

The Buehler Hand Grinder No. 1410 is a most convenient piece of equipment to facilitate the hand grinding of metallurgical specimens. Two grinding surfaces are available for two grades of abrasive paper. When four stages of grinding are desired two No. 1410 grinder units are employed. A drum (7½" diameter) at the head of each grinding surface holds up to 150 feet of abrasive paper that can be quickly drawn into position and clamped firmly for use.

Either wet or dry grinding can be conveniently performed on this grinder. The surface beneath the paper is highly polished heavy black plate glass. Overall dimensions are 15" x 26" x 8"; shipping weight 70 lbs. Polishing surfaces 4" x 12".

No. 1415 grinder accommodates standard size abrasive paper sheets. It serves in a like manner as No. 1410 for the convenient hand grinding of specimens. Overall size 17"x 11"x3". Shipping weight 30 lbs.

THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES—CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES

Buehler Ltd.

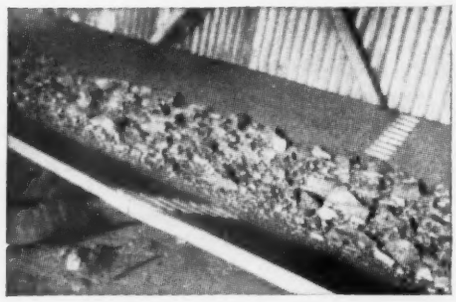
A PARTNERSHIP

METALLURGICAL APPARATUS

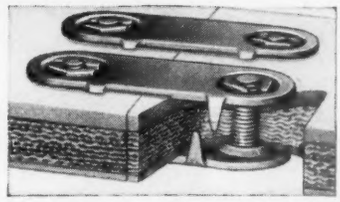
165 West Wacker Drive, Chicago 1, Illinois

FLEXCO®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH



Compression Grip distributes strain over whole plate area

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Bronze top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO.

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Mark it with KORN

METAL MARKING CRAYONS

Permanent markings on all types of hot, cold, wet or dry metals assured with these versatile crayons. Ideal for marking cores. KORN CRAYONS produce superior results under all conditions. Write today for *free samples* and price list. Inquiries from distributors are invited.

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"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION

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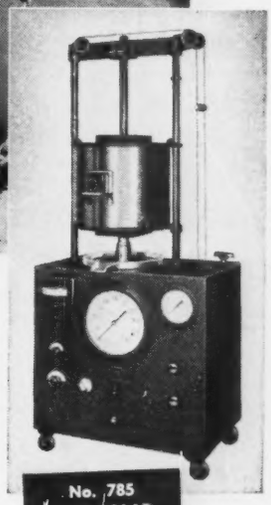
Phone 3-9135

GOOD CASTINGS FROM THERMOLAB TESTED SAND

Beloit Iron Works, Beloit, Wis., make these 12 ton Dryer Shells without loss. The Sand is tested daily in the Thermolab.



No. 785 THERMOLAB

Here is a good way to be sure your important castings will come out of the sand in perfect condition.

The above 5 foot Dryer Shell appears just as it came from the shakeout, clean and free from defects.

Beloit Iron Works consider the Thermolab an essential part of their quality control program. Savings in casting finishing operations alone, paid for the Thermolab in the first six months.

High temperature sand testing and control in the Dietert Thermolabs is the key to high casting quality.

HARRY W. Dietert COMPANY

CONTROL EQUIPMENT
SAND · MOLD · MOISTURE
CARBON · SULFUR

9330 ROSELAWN AVE. • DETROIT 4, MICHIGAN

The Dietert Co. will be glad to explain how a Thermolab can help you.

Write TODAY TO DEPT. B FOR DETAILS

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Chemists—Metallurgists

FOUNDRY SERVICE

THE FRANK L. CROBAUGH CO.

Phone SUperior 1-4712 CLEVELAND 13, O.

PRODUCERS CORE SAND CORPORATION

FITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN

MICHIGAN CITY, INDIANA

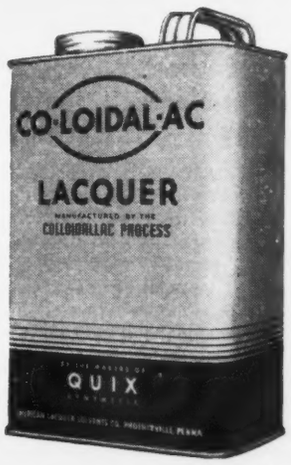
ONCE AND FOR ALL . . . STOP PATTERNS FROM STICKING!

Patterns come clean from the sand to make a perfect mold when they're coated with CO-LOIDAL-AC Lacquer.

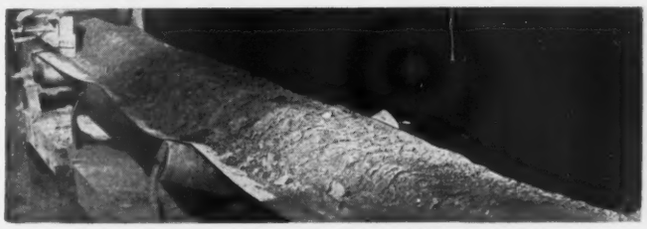
This hard, long-lasting finish is being used by more and more foundries as its advantages are discovered. Place a trial order today and see the improvement.

Direct factory-to-you sales makes possible exceptional value. Available in gallons or drums, clear or colors.

WRITE FOR COMPLETE INFORMATION



AMERICAN LACQUER SOLVENTS CO.
Parkiomen Junction, Phoenixville, Pa.



"Operation INFERNO!"

There is no finer belt—in performance, durability, all around economy—than Dandux specially treated, specially constructed hot belts. Maximum services delivered within specified temperature limits.

Through 300°F — DANDUX PYROFLEX No. 60-20
Through 450°F — DANDUX INSULEX No. 60-25
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Stitched Canvas Belting

INNER-SEWED — DANDUX BELTING — LOCK-STITCHED

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INDIVIDUAL INCENTIVE

PURO-SEAL FLUX

for producing BETTER BRASS *and* ALUMINUM CASTINGS

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FOR THE PURIFICATION OF METALS

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WELLMAN Williams Type

INSTANT "ON-AND-OFF" SERVICE ANYWHERE

The Wellman "Hook-on", single-line bucket is designed to provide clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Hook the yoke over the crane hook and the bucket is ready for work. When the job is finished, take the yoke off the hook and the crane is free for other duties.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

THE WELLMAN ENGINEERING CO. 7019 CENTRAL AVE. CLEVELAND 4, OHIO

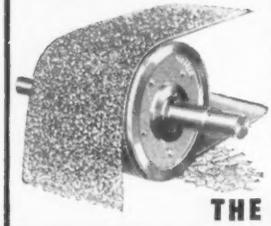
HERE IS THE ANSWER TO YOUR MAGNETIC SEPARATOR JOBS!

HOMER "Power-Plus" Magnetic Separators

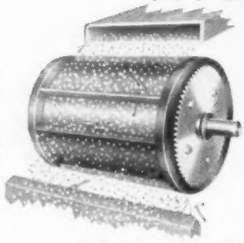
Permanent non-electric—Unaffected by Heat, Cold, Moisture

. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .

FOR SAND SLINGERS, CONDITIONERS AND CONVEYORS . .

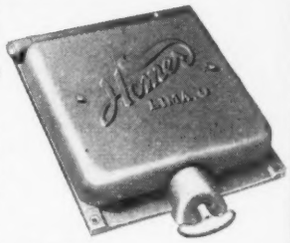


Homer MAGNETIC PULLEYS and UNITS — Available in standard diameters from 12" to 30"; belt widths 4" to 60". Special sizes upon order.



Homer MAGNETIC DRUMS—Available in standard diameters from 12" to 30"; face widths 4" to 60". Can be furnished with or without enclosure.

Homer MAGNETIC PLATES — Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.



Write for descriptive bulletins

THE HOMER MANUFACTURING CO., INC., DEPT. 156, LIMA, OHIO

SHOOT
YOUR MATERIALS IN PLACE
WITH THE
BLASTCRETE Machine

SAVE LABOR TIME COSTS

UNRESTRICTED AS TO BRAND OR TYPE OF LINING MATERIALS

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HANDLES PRE-TEMPERED CLAYS AND REFRACTORIES WITH MOISTURE CONTENT OF 4% OR MORE

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WRITE FOR FOLDER

QUICKLY PAYS FOR ITSELF IN ANY FOUNDRY

SHORT CUT TO PROFITS

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WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 26 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVE. • CLEVELAND, O.
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MILWAUKEE-TESSMER
Sprue Cutter
for
Non-Ferrous Foundries

- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
- Built for years of Rugged, Low-Cost Service.
- 2 Sizes, ¾" and 1¼" square. Built-in electric motor or belt drive.

Write for Illustrated Bulletin

RICE PUMP & MACHINE CO.
222 North 12th Ave. Grafton, Wisconsin

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"LUNGS FOR INDUSTRY"

BLOWERS • FANS • EXHAUSTERS

SERVING THE FOUNDRY INDUSTRY IN ALL USES INVOLVING THE MOVEMENT OF AIR.

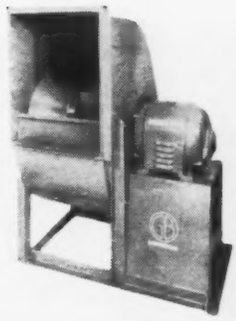
TURBO BLOWERS —Type S & M

GENERAL Type S. Turbo Blowers and Gas Boosters deliver air or gas up to 32 ounces duty. Serving cupolas, crucible furnaces, core ovens, annealing furnaces and other oil, gas and coke fired requirements.

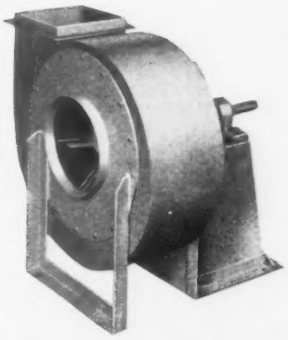
Ask for Bulletin CB 107. It illustrates and describes Types S. and M. GENERAL TURBO BLOWERS.

CENTRIFUGAL FANS—Type BB

This space-saving unit is designed for operation directly connected to motors of standard speeds. It is a non-overloading type used where varying flow resistance is encountered. Typical applications include heating, ventilating, air-conditioning, industrial oven recirculating, forced and induced draft. Special construction is available for high temperature operations.
Write for Bulletin BB 101.



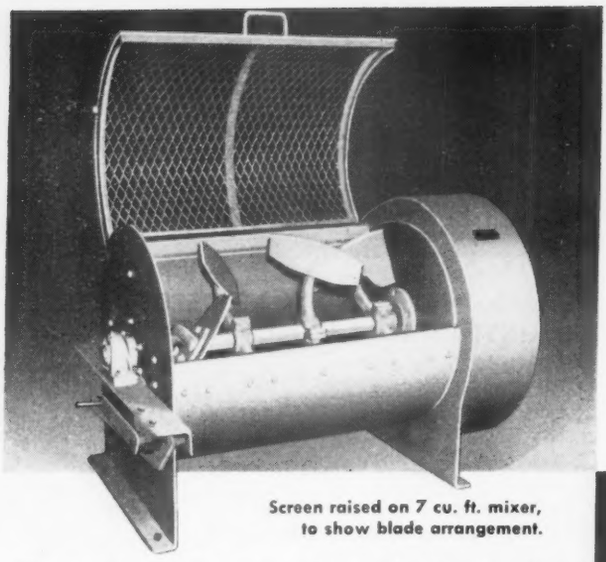
STEEL PLATE EXHAUSTERS



GENERAL Steel Plate Material Handling Exhausters convey air borne particles caused by grinding, polishing, buffing, plating, dusting, sawing, planing, routing, sanding or screening operations. High temperature air recirculation may require Class II, III or IV construction with water cooled bearings and shaft heat flingers.

Capacity tables and performance data are covered in Bulletin MX 104.

GB **GENERAL BLOWER COMPANY**
PLANT AND GENERAL OFFICES:
8601 Ferris Ave. Morton Grove, Illino's
Sales and Engineering offices in major cities throughout the country.

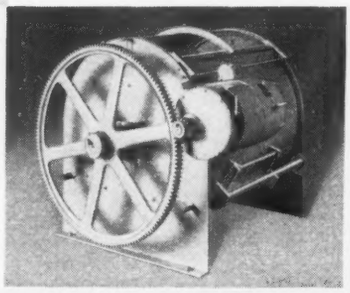


Screen raised on 7 cu. ft. mixer, to show blade arrangement.

For a fast 4-minute mix—
MULTI-MIXER

- With multi-blades for perfect mixing
- Direct drive motor, no clutch or belts
- Wear resistant liners and paddles

Get a fast 4-minute mix and ½-minute discharge for your core and molding sands, and cupola patch mixes. Get a perfect mix too, with the best blade arrangement in any mixer—it cuts, turns, and kneads ten times with each shaft revolution. These trouble-free Multi-Mixers come in capacities from 3 to 60 cubic feet. Larger and special mixers made to our specifications. See your foundry equipment dealer or write us direct.



Rear view of 7 cu. ft. mixer, with gear guard removed, showing direct drive motor. Anti-friction bearings throughout. Quick acting discharge door is operated from the front of the mixer. Mixers are shipped complete, ready to install and operate.

MULTIPLEX MACHINERY CORP. ELMORE OHIO

DOUGHERTY LUMBER
Mid-America's Largest
Serves the nation by the
CARLOAD—PART CAR—TRUCKLOAD
PIECE—PATTERN PINE—PATTERN
REDWOOD—PATTERN MAHOGANY
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POWDERED GLASS
AN EXCELLENT BRASS FLUX
—Economical—
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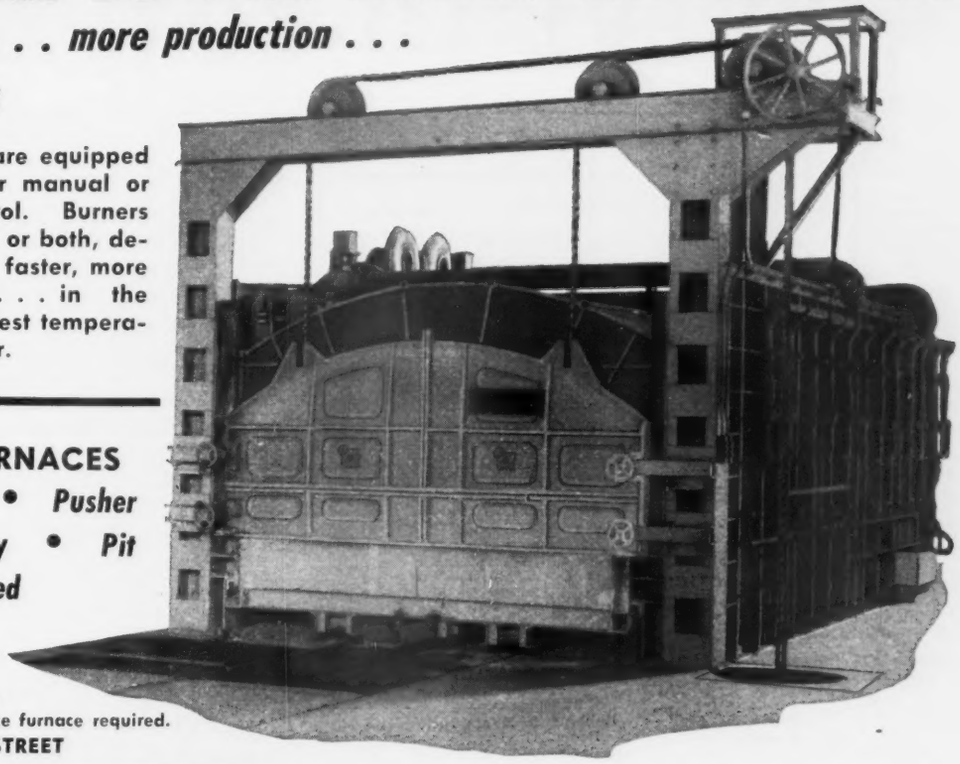

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Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

DEGASIFIERS
Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries, Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.

DEGRAPHITIZERS
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.

DEOXIDIZERS
Alter Company, 1702 Rockingham Road, Davenport, Iowa.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries, Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.

DEOXIDIZERS (Cont'd.)
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DEOXIDIZERS (Ferrous)
Carborundum Co., Perth Amboy, N. J.

DESCALING (Salt Bath)
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.

DESULPHURIZERS
American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Modern Equipment Co., Port Washington, Wis.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES
Cast Master Inc., 2123 Hamilton Ave., Cleveland 14, Ohio.
Kux Machine Co., 6725 North Ridge Ave., Chicago 26, Ill.

DOWEL PINS
Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)
Mall Tool Co., 7720 So. Chicago Ave., Chicago 19, Ill.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

DRILLS (Pneumatic)
Gardner-Denver Co., Quincy, Ill.
Mall Tool Co., 7720 So. Chicago Ave., Chicago 19, Ill.
Schramm Inc., West Chester, Pa.

DRUMS (Magnetic)
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.
Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

DUMP HOPPERS
Brummeler Steel Products Co., Grand Rapids, Mich.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS
Frank G. Hough Co., Libertyville, Ill.
Kwik-Mix Co., Port Washington Wis.
Prime Mover Co., Muscatine, Iowa.

DUST ARRESTING EQUIPMENT
American Air Filter Co., Inc. 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corp., Hagerstown, Md.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Research Corp., Bound Brook, New Jersey.

DUST ARRESTING EQUIPMENT (Cont'd.)
Schneible Co., Claude B., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Turner & Haws Engineering Co., 87 Gardner St., West Roxbury 32, Mass.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6101 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corp., Hagerstown, Md.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Claude B. Schneible Co., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Turner & Haws Engineering Co., 87 Gardner St., West Roxbury 32, Mass.
Whiting Corp., Harvey, Ill.

DUST CONTROL (Chemical)
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.

DUST RECOVERY SYSTEMS
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corp., Hagerstown, Md.

DYES & CHEMICALS
Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELECTRONIC CORE BAKING EQUIPMENT
Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.

ELEVATORS
Kent Machine Co., Cuyahoga Falls, Ohio.
Standard Conveyors Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Pneumatic, Material Handling)
Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Westover Engineers, 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

EXHAUST SYSTEMS

American Air Filter Co., Inc., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corporation, Hagerstown, Md.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Robbins & Myers Inc., Propellair Div., Springfield, Ohio.
Schneible Co., Claude B., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

FABRICATORS (Metal)

Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Penn Iron Works, Inc., Reading, Pa.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Deta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 16, Mich.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Pangborn Corp., Hagerstown, Md.
Robbins & Myers Inc., Propellair Div., Springfield, Ohio.

FASTENERS (Conveyor Belt)

Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

FEEDERS (Belt)

Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FEEDERS (Rotary)

Fuller Company, Catasauqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Kent Machine Co., Cuyahoga Falls, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Vibrating)

Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FERROBORON

Electro Metallurgical Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp., of America, 420 Lexington Ave., New York, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp. 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp. Canton 2, O.

FERROMOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Titanium Alloy Mfg. Div. National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILM (X-Ray)

Eastman Kodak Co., Rochester, N. Y.
General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FILTERS & LUBRICATORS (Air Line)

Logan Engineering Co., 4901 Lawrence Ave., Chicago 30, Ill.

FIRE BRICK

Babcock & Wilcox Co., 161 E. 42nd St., New York 17, N. Y.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.
General Refractories Co., 1520 Locust St., Philadelphia 2, Pa.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Mullite Refractories, Shelton, Conn.
Norton Co., Worcester 6, Mass.
Stevens Inc., Frederic B., Detroit 16, Mich.
Walsh Refractories, 101 Ferry St., St. Louis 7, Mo.

FIRE CLAY

Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
General Refractories Co., 1520 Locust St., Philadelphia 2, Pa.

FIRE CLAY (Cont'd.)

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

FIRE SAND

Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.

FIRESTONE

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FLASK BANDS

Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASK BUSHINGS

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Hines Flask Co., 3431 W. 140 St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASK CLAMPS

S. Obermayer Co., 2563 West 18th St., Chicago 8, Ill.

FLASK PINS

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Hines Flask Co. 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankemuth, Mich.

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Pressed Steel Flasks Inc., Eaton Rapids, Michigan.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK FITTINGS

Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

FLASK LIFT MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.
Rietz Lumber Co., 1810 N. Central Park Ave., Chicago, Ill.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.

FLEXIBLE COUPLINGS

Ajax Flexible Coupling Co., Westfield, N. Y.

FLEXIBLE SHAFT MACHINERY

Mall Tool Co., 7740 South Chicago Ave., Chicago 19, Ill.

FLOORING

Norton Co., Worcester 6, Mass.

FLUXES

Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Bassichis Co., Cleveland 13, Ohio.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Puro-Seal Co., 2323 West Third, Cleveland 13, Ohio.

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY ENGINEERS

Edwin S. Carman, 1643 Lee Road Cleveland 18, Ohio.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY LAYOUT & METHODS

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc. 600 West Jackson Blvd., Chicago 3, Ill.

FOUNDRY NAILS

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

FOUNDRY SUPPLY HOUSES (Cont'd.)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Foundry Equipment & Supply Co., 2970 West Grand Blvd., Detroit 2, Mich.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.
Cambell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.

FURNACES (Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14 Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mahr Manufacturing Co., Div. Diamond Iron Works Inc., Minneapolis 11, Minn.

FURNACES (Crucible Melting)

Ajax Eltrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Electric Melting)

Ajax Electric Furnace Corp., 46 Richmond St., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

FURNACES (Gas or Oil Fired) (Cont'd.)

Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave. Cleveland 15, Ohio.
Eclipse Fuel Engineering Co. 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnaces Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh Pa.
Reda Pump Co., Bartlesville, Oklahoma
Whiting Corp., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mahr Manufacturing Co., Div. Diamond Iron Works Inc., Minneapolis 11, Minn.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Induction Heating)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
General Electric Co., Schenectady, N. Y.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Oklahoma
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Whiting Corp., Harvey, Ill.

FURNACE BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mullite Refractories, Shelton, Conn.
National Carbon Co. Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Wadsworth Equipment Co., 555 Lafollette St., Akron, Ohio.

GANNISTER

Smith, Eugene W., 5344 W. Adams St., Chicago 44, Ill.
Western Materials Co., 39 S. LaSalle St., Chicago, Ill.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GAS BURNERS

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard St., Chicago 12, Ill.

GENERATORS (Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Edmont Mfg. Co., Coshocton, Ohio.
United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
B. F McDonald Co., 5721 West 96th St., Los Angeles 37, Calif.
Willson Products Inc., Reading, Pa.

GOUGING TOOLS

Arcair Co., 2614 Burwell St., Bremerton, Wash.

GRAPHITE

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills, Asbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
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Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.
American Lacquer Solvents Co., Phoenixville, Pa.
McDougall-Butler Co., 2929 Main St., Buffalo 14, N. Y.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN COATING (Rubber)

Foundry Rubber Inc., Bethesda, Maryland.

PATTERN COMPOUND

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Rietz Lumber Co., 1810 N. Central Park Ave., Chicago, Ill.

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, New York.

PATTERN PLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co., Quincy, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Wellman Bronze & Aluminum, 12800 Shaker Blvd., Cleveland 20, Ohio.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN SHOP EQUIPMENT

DoAll Company, Des Plaines, Ill.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERNS (Plastic)

Central Pattern Co., Quincy, Ill.

PATTERNS (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Anderson Pattern Inc., Muskegon Heights, Mich.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo N. Y.
Central Pattern Co., Quincy, Ill.
Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.

PATTERNS (Wood, Metal) (Cont'd.)

Cleveland Standard Pattern Works, 5337 St. Clair Ave., Cleveland 3, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 West Belmont Ave., Chicago 18, Illinois.
S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Wellman Bronze & Aluminum Co., 12800 Shaker Blvd., Cleveland 20, O.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PERMANENT MOLD CASTING

Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, New York.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.
General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

PISTON RINGS

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

PLATES (Bottom)

Adams Co., Dubuque, Iowa.

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.

Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

Shanafelt Mfg. Co., Canton, Ohio

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.

Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

Johns-Manville, 22 East 40th St., New York 16.

PLUMBAGO

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.

United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.

Dayton Pneumatic Tool Co., Dayton 1, Ohio.

Gardner-Denver Co., Quincy, Ill.

Independent Pneumatic Tool Co., Aurora, Ill.

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Keller Tool Co., Grand Haven, Michigan.

Master Pneumatic Tool Co., Inc., Orwell, Ohio.

Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.

Schramm Inc., West Chester, Pa.

POLISHING MACHINES

Bradford Machine Tool Co., 659 Evans St., Cincinnati, Ohio.

POURING DEVICES

Industrial Equipment Co., Minster, Ohio.

Modern Equipment Co., Port Washington, Wis.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

POWER PULLEYS

Iowa Mfg. Co., Cedar Rapids, Iowa.

PRECIPITATION (Liquid)

Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.

PRESSER BOARDS

Adams Co., Dubuque, Iowa. .....

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PROTECTIVE MATERIALS (X-Ray)

General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

PULLEYS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

Homer Mfg. Co., Lima, Ohio.

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

PUMPS

Construction Machinery Co., Waterloo, Iowa.

Gardner-Denver Co., Quincy, Ill.

Worthington Corp., Harrison, N. J.

PUMPS (Dry, Vacuum)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.

Fuller Company, Catasauqua, Pa.

Roots-Connersville Blower Div., Connersville, Ind.

PUMPS, OIL (Core and Mold)

Wilkinson Equipment Supply Corp., 6958 Wentworth Ave., Chicago 21, Ill.

PURIFIERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

PUSH-OFF MACHINES

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.

International Molding Machine Co., LaGrange Park, Ill.

Milwaukee Foundry Equipment Div. Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

PUTTY (Foundry)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Elematic Equipment Corp., 1150 W. Marquette, Chicago 2, Ill.

Foxboro Company, Foxboro, Mass.

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Marshall Co., L. H., 270 W. Lane Columbus 1, O.

Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Immersion)

Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Optical)

Pyrometer Instrument Co., Bergenfield, N. J.

RACKS (Core Ovens)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

Radium Chemical Co., Inc., 161 East 42nd St., New York 17, N. Y.

RADIUM

Radium Chemical Co., Inc., 161 East 42nd St., New York 17, N. Y.

RAMMERS

Keller Tool Co., Grand Haven, Michigan.

REFRACTORIES

Babcock & Wilcox Co., 161 E. 42nd St., New York 17, N. Y.

Carborundum Co., Niagara Falls, N. Y.

Carborundum Co., Perth Amboy, N. J.

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.

Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.

General Refractories Co., 1520 Locust St., Philadelphia 2, Pa.

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

Ironton Fire Brick Co., Ironton, O.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Mullite Refractories, Shelton, Conn.

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Norton Co., Worcester 6, Mass.

Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.

Richard C. Remmey Son Co., Hedley St. & Delaware River, Philadelphia 37, Pa.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.

United States Graphite Co., Saginaw, Mich.

Walsh Refractories, 101 Ferry St., St. Louis 7, Mo.

REGULATORS (Gas or Oil)

The North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

RESIN (Shell Mold)

Bakelite Corp., 300 Madison Ave., New York 17, N. Y.

Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.

General Electric Co., Pittsfield, Mass.

Hercules Powder Co., Wilmington 99, Del.

Monsanto Chemical Co., 1700 S. 2nd St., St. Louis 4, Mo.

RESPIRATORS

Wilson Products Inc., Reading, Pa.

RIDDLES (Electric)

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RISER COMPOUNDS

Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.

ROD DIP

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

ROD STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

ROLLER-HEARTH FURNACES (Electric Annealing)

General Electric Co., Schenectady, N. Y.

Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

ROLLERS (Conveyor)

Transall Inc., 109 11th St., North, Birmingham 4, Ala.

RUBBER LINING MATERIAL (Abrasive Resisting)

Pangborn Corp., Hagerstown, Md.

SAFETY CLOTHING

American Optical Co., Southbridge, Mass.

Edmont Mfg. Co., Coshocton, Ohio.

B. F. McDonald Co., 5721 West 96th St., Los Angeles 37, Calif.

Pangborn Corp., Hagerstown, Md.

SALT & SALT TABLETS

U. S. Safety Service Co., 1215 McGee St., Kansas City 6, Mo.

SAND (Core Molding)

Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.

SAND (Core, Molding, Blasting)

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.

Ayers Mineral Co., Zanesville, Ohio.

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.

Nugent Sand Co., Muskegon, Mich.

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

Ottawa Silica Co., Ottawa, Ill.

Pangborn Corp., Hagerstown, Md.

Pennsylvania Glass Sand Corp., First National Bank Bldg., Pittsburgh 22, Pa.

Producers Core Sand Corp., Michigan City, Ind.

Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.

Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SAND BLAST BARRELS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

Pangborn Corp., Hagerstown, Md.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND BLAST CABINETS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

Pangborn Corp., Hagerstown, Md.

SAND BLAST EQUIPMENT

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

The Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Illinois.

Pangborn Corp., Hagerstown, Md.

SAND BLAST EQUIPMENT (Cont'd.)

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAND BLAST NOZZLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Norton Company, Worcester 6, Mass.

Pangborn Corp., Hagerstown, Md.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND BLAST ROOMS

American Wheelabrator & Equipment Co., Washawaka, Ind.

Macleod Co., 2232 Bogen St., Cincinnati, Ohio.

Pangborn Corp., Hagerstown, Md.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND BLAST TABLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Pangborn Corp., Hagerstown, Md.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND CONTROL & TESTING EQUIPMENT

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

Harry W. Dietert Co., 9330A Roselawn Ave., Detrot 4, Mich.

Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND CONVEYING and HANDLING EQUIPMENT

Ajax Flexible Coupling Co., Westfield, N. Y.

American Air Filter Co., Louisville 8, Ky.

C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.

Clearfield Machine Co., Clearfield, Pa.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Crane Co., 836 South Michigan, Chicago 5, Ill.

Frank G. Hough Co., Libertyville, Ill.

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, 14, O.

Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.

Penn Iron Works, Inc., Reading, Pa.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Royer Foundry & Machine Co., Kingston, Pa.

SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)

Crane Co., 836 South Michigan, Chicago 5, Illinois.

Fuller Company, Catasauqua, Pa.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

SAND DRYERS (Cont'd.)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.

Crane Co., 836 South Michigan, Chicago 5, Ill.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDERS (Pneumatic)

Cleco Division of Reed Roller Bit Co., Houston, Texas.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.

Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Baker Perkins Inc., Saginaw, Mich.

Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.

Standard Sand & Machine Co., Blystone Division, 549 W. Washington Blvd., Chicago 6, Ill.

Clearfield Machine Co., Clearfield, Pa.

Construction Machinery Corp., Waterloo, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Kent Machine Co., Cuyahoga Falls, Ohio.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Muller Machinery Co., Metuchen 1, N. J.

Multiplex Machinery Corp., Elmore, Ohio.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.

Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Baker Perkins Inc., Saginaw, Mich.

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Co., The, 2424 N Cicero, Chicago 39, Ill.

Clearfield Machine Co., Clearfield, Pa.

Denver Equipment Co., 1400 17th St., Denver 17, Colo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

The Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Illinois.

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

Moulders Friend, Dallas City, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.

Royer Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

SAND RAMMERS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.

Dayton Pneumatic Tool Co., Dayton 1, O.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Keller Tool Co., Grand Haven, Michigan.

Master Pneumatic Tool Co., Inc., Orwell, Ohio.

Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.

SAND RECLAIMERS

Denver Equipment Co., 1400 17th St., Denver 17, Colo.

Hydro Blast Corp., 2550 N. Western, Chicago 47, Ill.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

SAND SIFTING and SCREENING MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Air Filter Co., Louisville 8, Ky.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Great Western Mfg. Co., Leavenworth, Kansas

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Pangborn Corp., Hagerstown, Md.

Royer Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

SAND STORAGE BINS & GATES

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.

Jeffrey Mfg. Co., Columbus 16, O.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Neff & Fry Co., Camden, Ohio.

Newaygo Engineering Co., Newaygo, Mich.

SAND TEMPERING CHEMICALS

Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.

SAWS (Band, Metal, Wood)

DoAll Company, Des Plaines, Ill.

Oliver Machinery Company, Grand Rapids 2, Mich.

SAWS (Cold Metal)

DoAll Company, Des Plaines, Ill.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SCALES

Hydroway Scales Inc., 20624 W. Eight Mile Road, Detroit 19, Mich.

SCALING HAMMERS

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Keller Tool Co., Grand Haven, Michigan.

Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.

Schramm, Inc., West Chester, Pa.

SCREENS (Shake-Out)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Simplicity Engineering Co., Durand, Mich.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

SEPARATORS (Abrasive)

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Logan Engineering Co., 4901 Lawrence Ave., Chicago 30, Ill.

Jas. A. Murphy & Co., Hamilton, O.

Pangborn Corp., Hagerstown, Md.

A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

SEPARATORS (Magnetic)

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.

Homer Mfg. Co., Lima, Ohio.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

SHAKEOUT MACHINE MOUNTING PADS

Fabreeka Products, Inc., 222 B Summer St., Boston, Mass.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

American Air Filter Co., Louisville 8, Ky.

SHAKEOUT MACHINERY (Cont'd.)

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

Royer Foundry & Machine Co., Kingston, Pa.

Simplicity Engineering Co., Durand, Mich.

SHELLMOLD (Equipment & Accessories)

Shellmold & Machine Co., 65 Pine Street, New York 5, N. Y.

Sutter Products Co., Dearborn, Mich.

Winter Engineering Corp., 7 South Dearborn St., Chicago 3, Ill.

World Bestos, New Castle, Indiana.

SHELL MOLDS—See RESIN

SHOCK ABSORBING PADS

Fabreeka Products, Inc., 222 B Summer St., Boston, Mass.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

American Steel Abrasives Co., Galion, O.

Carpenter Brothers, Inc. 606 West Wisconsin, Milwaukee 3, Wis.

Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.

Industrial Metal Abrasive, Jackson, Michigan.

Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.

National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.

Pangborn Corp., Hagerstown, Md.

Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.

Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.

American Wheelabrator & Equipment Co., Mishawaka, Ind.

American Steel Abrasive Co., Galion, O.

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.

Industrial Metal Abrasive, Jackson, Michigan.

Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.

National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.

Pangborn Corp., Hagerstown, Md.

Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Frank G. Hough Co., Libertyville, Ill.

SILICA FLOUR

Ayers Mineral Co., Zanesville, Ohio.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.

Pennsylvania Pulverizing Co., First National Bank Bldg., Pittsburgh 22, Pa.

Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SILICOMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Ohio Ferro-Alloys Corp., Canton 2, Ohio.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.

SILVERY PIG IRON see Pig Iron (Silvery)

SLIP FLASKS (See FLASKS, SLIP)

SLINGS (Chain)

American Chain Div., American Chain & Cable Co. Inc., York, Pa.

Jeffrey Mfg. Co., Columbus 16, O.

S. G. Taylor Chain Co., Hammond, Indiana.

SLIP JACKETS

Adams Co., Dubuque, Iowa.

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SMELTERS & REFINERS

Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.

Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

SNAGGING MACHINES

Bradford Machine Tool Co., 659 Evans St., Cincinnati, Ohio.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SODA ASH

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Hercules Powder Co., Wilmington 99, Del.

Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPACE HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

SPECIAL FOUNDRY ALLOYS

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Niagara Falls Smelting & Refining Div. Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.

Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

Rice Pump & Machine Co., 1026 S. 40th St., Milwaukee 15, Wis.

STARS (Tumbling)

Industrial Metal Abrasive, Jackson, Michigan.

STEEL SHOT

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.

Pangborn Corp., Hagerstown, Md.

Steel Shot Producers, Inc., Butler, Pa.

STEEL (Structural)

Alter Company, 1702 Rockingham Road, Davenport, Iowa.

American Bridge Co., Pittsburgh 19, Pa.

STRAINER CORES

American Clay Forming Co., Tiffin, Ohio

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

STRIPPING MACHINES

Adams Co., Dubuque, Iowa.

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

International Molding Machine Co., LaGrange Park, Ill.

Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

TANK TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TANKS (Dewatering)

Claude B. Schneible Co., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.

TAPE (Friction & Rubber)

Boston Woven Hose & Rubber Co., 29 Hampshire, Cambridge 39, Mass.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N.Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.

Illinois Testing Laboratories, Inc. 418 N. LaSalle St., Chicago 10, Ill.

Leeds & Northrup, 4901 Stenton Ave., Philadelphia 44, Pa.

Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

National Forge & Ordnance Co., Irvine, Warren Co., Pa.

TESTING MACHINES (Tensile)

Harry Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

National Forge & Ordnance Co., Irvine, Warren Co., Pa.

THERMOCOUPLES

Elematic Equipment Corp., 1150 W. Marquette, Chicago 2, Ill.

Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

Pyrometer Instrument Co., Bergenfield, N. J.

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

TONGS

Industrial Equipment Co., Minster, O.

TOOLS (Pneumatic Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.

Dayton Pneumatic Tool Co., Dayton 1, O.

Gardner-Denver Co., Quincy, Ill.

Independent Pneumatic Tool Co., Aurora, Ill.

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Keller Tool Co., Grand Haven, Michigan.

Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.

Linde Air Products Co., 30 E. 42nd St., New York 17

TOTE BOXES (see "BOXES-TOTE")

TRACTOR (Gas Powered)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Frank G. Hough Co., Libertyville, Ill.

TRADE ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.

TRAMRAIL SYSTEMS

American MonoRail Co., 13104 Athens Ave., Cleveland 7, Ohio.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Modern Equipment Co., Port Washington, Wis.

TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TROLLEYS

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1943 Kienlen Ave., St. Louis 20, Mo.

Modern Equipment Co., Port Washington, Wis.

TRUCK CRANES

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Casting)

Kwix-Mix Co., Port Washington, Wis.

Ready Power Co., 3826 Grand River Avenue, Detroit 8, Michigan.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

Ready Power Co., 3826 Grand River Avenue, Detroit 8, Michigan.

TRUCKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.

TRUCKS (Power Lift)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Frank G. Hough Co., Libertyville, Ill.

Ready Power Co., 3826 Grand River Avenue, Detroit 8, Michigan.

Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUBES (X-Ray)

General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

TUMBLING BARRELS

Royersford Foundry & Machine Co., Royersford, Pa.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Tumbling Barrels (Cont'd.)

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.

Modern Equipment Co., Port Washington, Wis.

Newaygo Engineering Co., Newaygo, Mich.

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS (Electric)

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

UNLOADERS (Car)

Kent Machine Co., Cuyahoga Falls, Ohio.

VALVES (Adjustable Orifice, Air, Gas, Oil, Water, Steam)

The North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.

The North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.

VALVES (Blow-off and Cut-off)

Bellows Company, Akron 10, Ohio.

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.

Wm. H. Nichols Co., Richmond Mill, Long Island 18, N. Y.

Ross Operating Valve Co., 120 East Golden Gate, Detroit, Michigan.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

VENTILATING SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.

Pangborn Corp., Hagerstown, Md.

Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.

Robbins & Myers Inc., Propellair Div., Springfield, Ohio.

Schneible Co., Claude B., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.

Demmler & Bros., Wm. Kewanee, Ill.

C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATION REDUCTION PADS

Fabreeka Products, Inc., 222 B Summer St., Boston, Mass.

New York Belting & Packing Co., 1 Market St., Passaic, N. J.

VIBRATORS

Adams Co., Dubuque, Iowa.

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

Vibrators (Cont'd.)

Cannon Vibrator Co., 1111 Power Ave., Cleveland 14, Ohio.

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

Davenport Machine & Foundry Co., Davenport, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.

Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

Syntron Company, Homer City, Pa.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephen Mfg. Co., Urbana, Ohio.

WASH ROOM EQUIPMENT

Bradley Washfountain Co., Box 732, Milwaukee 1, Wis.

WAX (Core, Vent, Pattern)

United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WEIGHING DEVICES

Hydroway Scales Inc., 20624 W. Eight Mile Road, Detroit 19, Mich.

WELDING GAS

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric arc)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING and CUTTING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)

National Carbon Co., Div. Union Carbide & Carbon Corp. 30 E. 42nd St., New York 17, N. Y.

United States Graphite Co., Saginaw, Mich.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

Welding Rods & Electrodes (Cont'd.)

Stulz-Sickles, 92 N. J. Railroad Ave., Newark 5, New Jersey.

WETTING AGENTS

Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.

Pelron Corp., 7740 West 47th St., Lyons, Illinois.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.

George H. Bullard Co., Westboro, Mass.

Carborundum Co., Perth Amboy, N. J.

Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.

Macklin Company, Jackson, Mich.

Norton Company, Worcester 6, Mass.

Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.

Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire Brush)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE BENDERS

Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE NAILS

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

WOODWORKING MACHINERY

DoAll Company, Des Plaines, Ill.

Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.

General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

ZIRCON SAND

Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

CLASSIFIED ADVERTISING

Help Wanted

FOREMAN CASTING INSPECTION

Mechanized grey iron foundry located in Northern Ohio. To have charge of first and final casting inspection. Must have good knowledge of production machining, be able to read blue prints and do layout work. Fine opportunity for advancement. In reply give all information as to qualifications, work record and references. Salary and bonus.

BOX 358

FOUNDRY CLEVELAND 13, OHIO

CLEANING ROOM SUPERINTENDENT

To supervise cleaning, inspection, finishing and shipping in a large modern, mechanized gray iron foundry located in Northern Ohio.

Knowledge of equipment and standards necessary.

Salary and bonus.

Send complete information, resume, experience, and references.

All replies confidential.

BOX 234

FOUNDRY CLEVELAND 13, OHIO

CORE ROOM FOREMAN

Experienced with malleable or gray iron pipe fitting cores. None other need apply. Position open with growing California company. Enclose complete resume of past experience, education, together with photo to:

BOX 334

FOUNDRY CLEVELAND 13, OHIO

FOUNDRY FOREMEN

Northern Ohio steel foundry needs experienced foremen in following departments:
Molding (Squeezers, Osborns, Sandslinger)
Melting (Electric Furnace)
Cleaning
Please write full information in confidence. Salary.

BOX 349

FOUNDRY CLEVELAND 13, OHIO

GENERAL FOUNDRY FOREMAN

Steel jobbing foundry in Cleveland, Ohio has position available for aggressive foundryman. Must have well-rounded foundry experience and be capable of coordinating core room, squeezer floor, rollover floor, loose work and big floor work. In reply state age, experience, salary expected and when available.

BOX 342

FOUNDRY CLEVELAND 13, OHIO

PROCESS METALLURGIST

Young metallurgical engineering graduate wanted who can qualify for and grow in metallurgical department of large, progressive foundry company. Experience in cast iron process metallurgy, gating and risering, scrap analysis, etc. desirable. Reply giving age, education, experience and other pertinent details. Address: Box 239, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Experienced on conveyor operations for completely mechanized nonferrous foundry. Must be a leader, capable of controlling men and increasing output. Good salary plus incentive bonus. Excellent opportunity for your immediate and future advancement. Replies strictly confidential. Address: Box 381, Reading, Pa.

SUPERINTENDENT OR GENERAL FOREMAN

Gray iron foundry with capacity 40 to 50 tons daily, located Lower Michigan. Produces light and heavy castings on jobbing floors, squeezers and rockovers. Capable, aggressive man can have a very exceptional opportunity! Plant well equipped and company strong financially with many years successful operation. Age 45 or under.

BOX 224

FOUNDRY CLEVELAND 13, OHIO

SUPERINTENDENT

Opportunity for well qualified experienced superintendent of nonferrous foundry employing from 100 to 150 people. Applicant should be between 35 and 45 years of age. Enclose photograph and state complete record of education and experience in detail including previous employment and length of service. Address: Box 207, FOUNDRY, Cleveland 13, Ohio.

CHIEF ENGINEER

SALARY $8000—$10,000

Permanent mold and die cast die design experience in light metals required. Man we want has a sound record behind him and has top management ambitions for the future. Bonus plan. Write in detail. Address: Box 121, FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD ENGINEER

Expanding Illinois Aluminum foundry offers excellent opportunity for active participation in ownership to permanent mold designer with excellent qualifications and experience and a desire to build on a worthwhile enterprise.

BOX 190

FOUNDRY CLEVELAND 13, OHIO

Help Wanted

CORE ROOM FOREMAN

Experienced in high production with Demmler core blowers. Using split core boxes to dryers. For malleable pipe fittings. Must be able to handle people and follow schedules. Position open with growing California company. Enclose complete resume of past experience, education with recent photo to:

BOX 335

FOUNDRY CLEVELAND 13, OHIO

CHIEF INSPECTOR

Must have malleable iron pipe fittings experience. Prefer one who is familiar with galvanizing. Position open with aggressive pipe fittings manufacturer. Salary commensurate with ability and background. Send full resume and recent photo with first letter to:

MALLEABLE FITTINGS CO. OF CALIFORNIA
1040 W. LOMITA BLVD.
HARBOR CITY, CALIF.

FOUNDRY METALLURGIST

Wanted for supervisory position by aluminum and bronze foundry in Northern Ohio. AAA-1 Co. Address: Box 182, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY MEN

Experienced supervisors in pattern, foundry, core, cleaning, inspection, open hearth and process control required for large government owned defense plant in Chicago area currently engaged in production of armor castings. All levels of supervisors required. Company organizational setup of sufficient size and aggressiveness to afford permanent opportunity to supervisors whose performance proves above average. Address: Box 999, FOUNDRY, Cleveland 13.

FOUNDRY ENGINEERS AND DRAFTSMEN

Having foundry operating or plant engineering experience. Write, enclosing photograph and complete record of education and experience in detail, including previous employers and length of service. State age and salary expected. ADDRESS: LESTER B. KNIGHT & ASSOCIATES, INC., 600 W. JACKSON BLVD., CHICAGO 6, ILL.

GREY IRON FOUNDRY FOREMAN

Young man with several years' experience now ready for advancement to take charge of and be responsible for molding and sand preparation producing small to medium grey iron castings. Address: Box 341, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly experienced man in aluminum permanent mold for modern midwest foundry. Magnesium experience helpful. Essentials are ability to handle people and maintain production schedules. Technical background helpful, not required. For a qualified man who probably has at least ten years' experience, salary is open and future unlimited. Bonus plan. Send complete resume in confidence. Address: Box 122, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

PRODUCT ENGINEER

For steel and iron foundry. Must know design engineering and have some foundry experience. Permanent job with good chance for promotion in an old established company. Address: Box 237, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Graduate, to control metal, sand and cores in Northern Ohio steel foundry. Please write fully first letter. Strictest confidence. Salary. Address: Box 348, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Large nonferrous smelter and refiner. State training, experience and references in first letter. Address: Box 337, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Nonferrous smelter and refiner. State training, experience and references in first letter. Address: Box 332, FOUNDRY, Cleveland 13, Ohio.

CASTINGS SALESMAN

Experienced castings salesman would like a commission sales contract with a dependable production malleable iron foundry for Northern Ohio and Michigan. Address: Box 238, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

MANUFACTURERS' AGENT

Wanted to sell industrial ovens and furnaces in following territories: New England, Southern Ohio, St. Louis area, Chicago. Commission basis. Men with technical experience preferred. Address: The Carl-Mayer Corporation, 3030 Euclid Ave., Cleveland 15, Ohio.

REPRESENTATIVE

Calling on foundries, die casting plants and metal industries in Pittsburgh area and part of Pennsylvania. Also man for Illinois to sell products of well established firm. Replies should include previous experience. Address: Box 352, FOUNDRY, Cleveland 13, Ohio.

For Rent

FOR RENTAL

Production patterns, flasks and machines for quantity production of the popular stock sizes of ornamental entrance railings. Cast in iron or aluminum. Particulars to established rated firms, only. Address: Box 346, FOUNDRY, Cleveland 13, Ohio.

Opportunity

FOUNDRY EXECUTIVE & BUSINESS MANAGER

To participate in ownership of a jobbing iron and brass shop, new plant, well equipped, good steady customers. Excellent opportunity for man with ability to run a foundry. Present executive wished to retire. Address: Box 330, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANUFACTURERS' AGENT OR SALES REPRESENTATIVE

Metallurgical engineer familiar with all phases of foundry and metalworking industries is seeking connection as manufacturers' agent or sales representative in Milwaukee area. Address: Box 354, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 222, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Successful background as superintendent in shops up to 300 men. Excellent record on quality control, organizing ability, production and costs. Technical and consultant experience on sand properties, cupola operation and mechanization. Gray iron, large or small, jobbing or production. Age 43. Address: Box 235, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT

Age 35—16 years in light metals. Excellent background of metal control, laboratory work, trouble-shooting in foundry. Superintendent, aluminum and magnesium permanent mold foundry. Good technical and business education. Now employed. Address: Box 233, FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Twenty-eight years of gray iron experience and some nonferrous. Outstanding practical and technical background. Have supervised as many as three hundred men, 125 tons daily, production and jobbing, mechanized or semi. Excellent cost man, ability to handle men and can obtain results. Age 47. Address: Box 991, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGEMENT

Twelve years' practical experience in all phases steel foundry operations including manganese, armor, heat and corrosion resistant castings. Complete charge of all plant operations last six years. Graduate metallurgist. Age 36. Address: Box 225, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Young, first class patternmaker has engineering education, experienced planning, modernizing and designing experimental or production pattern equipment. Have doubled production in shop. Available October 1st. Address: Box 355, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT AVAILABLE

Twenty-five years' experience in pattern, nonferrous sand foundry and permanent molding. Extensive background in management, estimating and cost, also handling and training of personnel. Prefer Middle West location. Address: Box 345, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

Gray iron foundry experience well versed in all phases of foundry management including costs, sales planning, small and medium heavy castings. 28 years' practical experience. Small foundry preferred. Salary and production bonus. Address: Box 344, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Over twenty years' supervisory capacity with present employer desires change. Qualified in fully mechanized or semi-production methods in producing full line automotive castings. Experienced in casting control and modern core production methods. Address: Box 336, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

FOREMAN—WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS

Twenty-two years as foreman and department manager in wood patternmaking including also ten years purchasing patterns and castings, expediting and coordinating. Experience on general machine patterns, power presses, rolling mill equipment, etc. Best of references from wherever pattern equipment was used. Address: Box 209, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Diversified supervisory experience in mechanized foundry production, control, research. Presently employed metallurgist responsible for production chemical, sand and metallurgical laboratories, raw material procurement. Experienced duplex melter, heat treater. Desires position as metallurgist or supervisor in gray iron steel foundry. Address: Box 236, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 797, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY METALLURGIST

Graduate, age 32, married, two children, with management experience desires position as assistant superintendent or supervisor in foundry in midwest. Broad technical background for field service if necessary. Can handle personnel, sand control, melting problems, methods, radiography, costs, safety, gating and risering, military specifications and would like to develop incentive system. Being released from Navy in October, available for interview now. Address: Box 229, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR EXECUTIVE ASSISTANT

Experienced as works manager, production superintendent and sales engineer of foundry producing heat resistant and stainless castings; also as chief metallurgist of tractor works. Desires position with progressive organization. Address: Box 223, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

WORKS MANAGER OR EXECUTIVE ASS'T.

Experience as metallurgist, sales engineer and works manager of jobbing foundry producing grey iron and aluminum castings. Graduate metallurgist Lehigh University. Address: Box 343, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

B. S. Metallurgical Engineering. Two and half years' experience in metallurgical and chemical laboratories, melting and annealing departments of malleable foundry. Now employed. Desire responsible position in metallurgical capacity. Address: Box 353, FOUNDRY, Cleveland 13, Ohio.

CHIEF METALLURGIST

Thirty years' experience in cast carbon, low alloy austenitic manganese and high alloy steels. Engineering degrees. Administrative ability. Now employed. Address: Box 347, FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Desires position with small or medium nonferrous jobbing or production shop. Will relocate. Fifteen years' experience all phases. Top references. Married and steady. Age 32. Address: Box 340, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN FERROUS OR NONFERROUS

Capable of taking complete charge of all operations. Production or general jobbing work. Can produce quality castings at minimum cost. Practical and technical training. 47 years of age. Address: Box 357, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Who can get results. Practical molder. Good executive. Wide experience all classes of work. Expert metallurgist and melter. Address: Box 232, FOUNDRY, Cleveland 13, Ohio.

Available Capacity

OPEN CAPACITY

Gray iron jobbing foundry has open capacity for production work. Quotations handled promptly. Address: Box 231, FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

CLASSIFIED ADVERTISING

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in Steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions.

WRITE or CALL for registration.

Completely Confidential

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

Wanted-To-Buy

WANTED

Need for production—Simpson Mixer, Raymond Mill, one or two vibrating screens. Please give full particulars. P. O. BOX 1351 CHURCH STATION, NEW YORK 8, N. Y.

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY

765 PENOBSCOT BLDG. DETROIT 26, MICH.

WOODWARD 1-1894

WANTED

Flask—Steel or Cast Iron
10′ diameter
1 12″ cope
2 10″ drags
3 8″ drags
2 Bottom plates
1″ thick in steel
2″ thick in cast iron

CROWN NONFERROUS FOUNDRY INC.
CONCORD AVE.
CHESTER, PA.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

Used horizontal casting machine. Able to take 16″ long flasks.

FAIRMOUNT STEEL CORPORATION

3720 MAIN ST. PHILADELPHIA 27, PA.

WANTED

Hines Aluminum pop-off flasks with aluminum pouring jackets. All sizes. Must be in excellent condition. Address MARCH-BROWNBACK CO., INC., POTTSTOWN, PA.

WANTED

1—#4 Cupola with blower and skip charger Simpson Mixers. Address: Box 350, Foundry, Cleveland 13, Ohio.

WANTED

Match plate pressure casting equipment—new or used. Address: Box 339, FOUNDRY, Cleveland 13, Ohio.

WANTED

Rollover machine air operated to handle capacity 1,000 lb. table size 30″ with 10″ to 12″ draw. Give model and serial number. Address: PRECISION ALUMINUM FOUNDRY 5269 W. GRAND AVE., CHICAGO 39, ILL., NATIONAL 2-4712.

Foundries For Sale

FOUNDRIES FOR SALE

IRON FOUNDRY producing 20 tons small machinery castings per day. Excellent equipment for low cost production. Well trained personnel. This plant is priced low.
IRON FOUNDRY in rural area producing light and medium castings. Price $35,000, easy terms.

EDWARD H. ZOLL

FOUNDRIES SOLD AND LEASED

790 BROAD ST. NEWARK 2, N. J.

MAGNESIUM FOUNDRY

Located small Oklahoma town. Excellent labor, no union. Building 60′ x 130′ with clean office. Concrete floor throughout. Excellent equipment. Immediate possession. Several good accounts presently being serviced including government work. Price $25,000. Will consider lease or profit sharing arrangement with experienced foundry manager. Address: Box 1424, Tulsa, Oklahoma.

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOUNDRY FOR SALE—GRAY IRON

Located Northeastern Ohio—in Dover. Personnel available for immediate operation. Building and equipment suitable for jobbing work. Address: SCHRADER FOUNDRY, Box 149, Dover, Ohio.

FOUNDRY FOR SALE OR LEASE

To experienced people who can continue to make our castings. Has eight molding machines, wheelabrator, sand cutter, pattern shop, railroad. Address: CUNNINGHAM MACHINERY CORP., BOX 56, SHREVEPORT, LA.

FOUNDRY FOR SALE

Small brass and aluminum foundry located in large midwest industrial city. Doing excellent business, room for expansion. Includes nearly new building, equipment and land. Excellent opportunity. Price $8500. Address: Box 338, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

One-third interest in iron foundry. This is a going business in Los Angeles county. Three partners, having a substantial drawing account monthly. Can possibly buy a half interest. Seller retiring. Address: MURPHY, 5921 LEEDS AVENUE, SOUTH GATE, CALIF.

For Sale

FOR SALE

3—Portable Sand Slingers
1—48 x 72″ Wheelabrator
1—#60-41 Speedmuller with Skip Hoist and Sand Cooler.
1—Rotary Oil Fired Sand Dryer, 20′ x 12″ diameter.
5—Heavy Duty Snag Grinders 7½—20 HP
2—Herman Rollovers—40 x 60″.
Davenport and Johnston & Jennings Jolt Strippers
Core Ovens—all types. Small Tower Oven.
125 Tons Steel Flasks
2—Sand Cutters. 1—Molders Friend.
5—Model "S" Screenerators
3—Swing Frame Grinders
1—Holcroft Rotary Annealing Furnace.
All kinds of Melting Furnaces.

SEND FOR ITEMIZED FOLDER.

UNIVERSAL MACHINERY & EQUIPMENT CO., 320 EAST BROAD STREET,
SHILLINGTON, PENNA.
R. B. HARRISON, MGR.

PHONES—READING 3-0311—4-0146.

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42
Hurry, 2 more have been released for immediate sale priced 3 to $4000.00.
Wheelabrator size 48 x 72 like new. $9000.00.
Wheelabrator size 48 x 48 good condition. $6000.00.
Wheelabrator 4 Ft. Table Blast w/tables $1750.00.
Wheelabrator 27 x 36 Tumblast good condition—rubber belt $3000.00.
Pangborn 1GF Air Tumble Bbl. 150# load cap.
Pangborn ES-207 Blast Cleaning Cabinet used for strip steel or bar stock $1750.00.
Pangborn 8 ft. table with 7 28″ tables $4000.00.
Sand Blast room 15 x 12½. Good condition.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SALES INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE

600 (Six Hundred)—TOTALLY ENCLOSED MOTORS, NON VENTILATED & FAN COOLED Just removed from a Government Foundry—closed down since 1946.
1/3 H.P. to 100 H.P.—900 to 3600 R.P.M. All Motors Ball Bearing & Nema Frame. SAVE up to 75%—ALL GUARANTEED—Any Quantity.

ALLIED MATERIALS HANDLING CO.,
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE

1—Detroit electric furnace, type CC-60K.W. 3000 lb. capacity. Two linings. Two shells. New. Original crate. No transformer. Price $14,500.00.

BOX 333
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

One Hoffco vac super duty portable vacuum cleaner complete with 5 H.P. 440 volt motor and starter and complete set of cleaning tools. Excellent condition. Used very little. Price $700.00 FOB our plant. Address: Box 331, FOUNDRY, Cleveland 13, Ohio.

FLASKS

Sterling Wheelbarrow Rolled Steel
11 sets 46 x 50 6″ cope, 6″ drag
9 sets 36 x 44 6″ cope, 6″ drag
12 sets 32 x 48 6″ cope, 6″ drag
12 sets 32 x 48 6″ cope, 8″ drag
Condition: like new. Priced right.

JOLT-STRIP MACHINE, Herman mfg., 6000# series, 48 x 54 table, 12″ draw. Late model, exc. cond. $2,500.00 f.o.b.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, O.

For Sale

FOR SALE

MOLDING MACHINES
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—#815 Johnston & Jennings Air Jolt Rollover Draw 30 x 40 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
1—International RJ 20 x 8 Air Jolt Hand Rollover Draw.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
3—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.
BLOWERS FOR CUPOLAS AND FURNACES
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
1—Connorsville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
2—#7½ Rotary Blowers 27 x 81, 14000 CFM.
METAL MELTING EQUIPMENT
5—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
MISCELLANEOUS
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—NB-2 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
1—McLeod Small Sand Blast Barrel 24 x 24
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

Vertical Tower Core Ovens—40 Ft. and 60 Ft. ..... Each $10,000.00
(2) Johnston & Jennings Jack Rabbit No. 401 C Jolt Squeeze machines; 12" cylinder; new in 1948 ..... Each $275.00
#918 Johnston & Jennings Jolt Rollover and Pattern Draw—Table Size 44" x 54" $1500.00
Herman Hi Speed Rollover & Pattern Draw Molding Machine—1500 lb. series; table size 36" x 48" $1500.00
(2) RES International jolt, squeeze, rollover and draw molding machines; 800 lb. cap.; used very little ..... Each $1100.00
4000 lb. & 6000 lb. Clark Fork Lift Trucks; good condition ..... Each $1500.00
5000 lb. Automatic Fork Lift Truck; Electric; with Edison battery $1500.00

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

FOR SALE

3 Osborn No. 275 J Jolt Squeeze Molding Machines. Table 17 x 20".
1 Osborn No. 276 J Jolt Squeeze Molding Mach. Table 26" x 20.
1 Sly Hand Blast Complete. All Machines near new.
Pangborn Sand Blast Room, No. 4. 12 ft 6 in. x 11 ft wide, 7 ft 6 in. high. Rotary Table 7 x 6 ft. Pangborn Dust collector No. 6—CC.

JAY SALTER
306 ROSEDALE ST. ROCHESTER 7, N. Y.

FOR SALE

CORE BLOWER—Champion Model CB-400—#6344. Complete, excellent cond. Osborne Side Vibrators—1000—All sizes, all new.
CONVEYOR—6" width, 4" centers, hevi duty, 1000 ft., excellent cond. Belt Conveyor—6000 ft. of belting up to 36" wide with Idlers, Speed Reducers, Pulleys, etc.
SPACE HEATERS & AIR CONDITIONERS (40)—used for heat in winter (steam) and Blowers in summer. 5 HP at 900 RPM.
Exhaust Fans—24" to 48".

ALLIED MATERIALS MANDLING CO.,
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE

1—Type FS347 Ingersoll Rand centrifugal motor blower rated at 4400 CFM at 1.25 pounds pressure with General Electric air weight control—40 HP motor, 220-440 V—60 cycle. Perfect condition. Make offer. Address CARONDELET FOUNDRY COMPANY, ST. LOUIS 10, MISSOURI.

For Sale

FOR SALE

Two tumbling mills 25" x 60" inside. Complete with bearing for mounting on concrete supports and dust piping.

WEBSTER MANUFACTURING INC.
TIFFIN, OHIO

FOR SALE

American Wheelabrator No. 2 table with 8-24" multitables complete motors, controls, dust tube collector fan—$3750.
Royers sand mixer—$175.
Sandblasting room 13' x 7' with McLoud 2000 lb generator gravity feed, walk in.—$650.00.

M. ELSTEIN
141 MANGIN STREET NEW YORK 2, N. Y.

FOR SALE

1—International type PK Jolt Squeeze Pin Lift 18" cylinder, 8" lift
1—Champion Core Roll-over, 16" x 8", Portable
1—3 HP Stand Grinder

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

1948 INVOICE PRICE

Unused 90 inch cupola, skip hoist charger, blower with automatic controls all in original container. Purchased as a unit.

UNITED STATES STOVE CO.
SOUTH PITTSBURG TENNESSEE

FOR SALE

1 #275 Stroman Type OH Tilting Furnace, Silicon Carbide Lining, Natural Gas Fired, with #1603 Stroman Blower, 220V, 3 Phase, 60 Cycle.
1 Stroman Ladle Heater for above, with blower. Above equipment brand new. Reasonable, price.

VICTORIA METAL CO. INC.
W. 20TH & HAYBARGER AVE. ERIE, PA.

EQUIPMENT FOR SALE

1—Model AM American sandcutter— size 74-50. Excellent condition $1500.00
2—SPO #506 jolt rockover draw molding machines. Practically new ..... $1400.00 each
1—SPO jolt pin lift machine #305—perfect condition $400.00

PROSPECT FOUNDRY COMPANY
1225 WINTER ST. N. E.
MINNEAPOLIS 14, MINN.

FOR SALE

General Blower, 10 H.P. 16 oz. 1750 cfm. 220-440, 3 phase, 60 cycle, with starter, $150.00. Model M screenerator, $250.00. Royer, $50.00. Address: BARCLAY FOUNDRY INC., 1555 SO. BARCLAY, MILWAUKEE, WIS.

FOR SALE

Riehle Testing machine, 50,000# tensile and compression.
Oil filters, Sperry, 18" x 18", plate and frame, closed delivery, 11 chambers.
Simpson sand mixers, #0, #1, #1½, #2, #3.
Miscellaneous: Screens, grinders, pulverizers, all types conveyors, tyler rotap screen, etc.
LOW PRICE QUICK DELIVERY

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

40—17x18 Steel Flasks, Cope 5", Drag 3½ Deep also 40 Aluminum Bottom Boards $400.00
1—Gardner-Denver V Type Air Compressor 85 cu. ft. displacement with 15 HP motor and V belt drives .. $500.00
1—Gardner-Denver Twin Cylinder upright 60 cu. ft. displacement with 10 HP motor and V Belt Drives. Both in good operatingg condition 400.00
1—Electric Hoist capacity 2000# 90.00
1—75 ft. Electric Reel 40.00
2—4000# Battery powered Lift Toters and 1 battery charger. .....Total 500.00
1—dozen Snap Flasks 12x20, 14x16, 12x18 ..... 150.00
ALL PRICES FOB KANSAS CITY, MO.

FRANK R. WESTWOOD
6398 THOMAS KANSAS CITY 3E, MO.
PHONE—FL 2264

For Sale

FOR SALE

JOLT-STRIP MACHINE—Herman, 6000# series 48 x 54 table, 12" draw. Late.
JOLT STRIPPER—Osborn, Model 405, 21 X 53.
JOLT ROLL OVER—Osborn, Model 406 36 X 24.
JOLT STRIPPER—Osborn, Model 406, 36 X 52.
R-C POSITIVE BLOWER 12 X 20, 20 hp.
R-C POSITIVE BLOWER 22 X 66, 75 hp.
V.C.G.—3 SUPER GYROSET SHAKE OUT, 6' X 8' deck, complete.
JOLT SQUEEZE PIN LIFT MACHINE—Int'l PKL 12—portable.
SAND CUTTER—Am. Model AA, #1111, 15 hp, 220/440 v.
(2) PEDESTAL GRINDERS, Webster & Perkins—1200 rpm.
STAND PEDESTAL GRINDER—Everett.
FLASKS — STERLING WHEELBARROW ROLLED STEEL—Cond: like new, priced right.
2(two) Sets 32 X 48 6" cope 6" drag
12(twelve) Sets 32 X 48 6" cope 8" drag

ALLIED MATERIALS HANDLING CO.,
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE
TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	675	16 oz.	Spencer
4000	32 oz.	Spencer	660	20 oz.	A-B
4000	16 oz.	Spencer	650	16 oz.	Spencer
2800	1 oz.	Spencer	500	10 oz.	No. Am.
2700	16 oz.	No. Am.	400	4.3 oz.	Spencer
2700	16 oz.	Spencer	400	16 oz.	Spencer
2500	7 oz.	Sturt.	340	20 oz.	A-B
2200	16 oz.	No. Am.	320	12 oz.	Spencer
2000	2½ oz.	Spencer	225	16 oz.	Spencer
2000	1 oz.	Spencer	180	15 oz.	Spencer
1150	20 oz.	No. Am.	9100	7" SP	Sturt.
800	8 oz.	No. Am.	1100	4½" SP	Bayley
			100	7" SP	Spencer

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY BRINGS RESULTS!

IF YOU ARE SEEKING A CHANGE OF POSITION TO BETTER YOUR SITUATION AND ARE QUALIFIED FOR A BETTER JOB, TELL THE 45,000 READERS OF FOUNDRY ABOUT IT.

DON'T "HIDE YOUR LIGHT UNDER A BUSHEL"—THERE ARE TIMES WHEN A MAN SHOULD TALK ABOUT HIMSELF AND THERE ARE A LOT OF MEN QUALIFIED FOR BETTER POSITIONS WHO DO NOT KNOW HOW TO GO ABOUT IT OR WHERE TO SEEK HIGHER RESPONSIBILITIES.

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY WILL BE WIDELY READ AND THE RESULTS MAY SURPRISE YOU!

IT COSTS BUT LITTLE. WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

WRITE

FOUNDRY

CLASSIFIED ADVERTISING DEPT.

PENTON BLDG., CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING

For Sale

FOR SALE

2—Davenport molding machines Model No. 28SARC
27 x 40 pattern plate
30 x 48 Flask
12" draw
21¾" depth
In good condition
2—Demmler core blowers
Models 889 and 808

In good condition and available for inspection at

WELLMAN BRONZE & ALUMINUM CO.
2525 E. 93RD ST.
CLEVELAND 4, OHIO

EQUIPMENT FOR SALE

2—Osborn #601 jolt rollover pattern draw machines.
1—Milwaukee #60-B jolt rollover pattern draw machine.
1—American wheelabrator tumblast 27 x 36 without skip hoist.
1—American wheelabrator tumblast 36 x 42 with skip hoist.
1—American A M sandcutter.
1—American A.A. sandcutter gasoline driven.
2—U. S. Johnson & Jennings #2 jolt squeeze pinlift machines.
2—Tabor portable jolt squeeze pin lift machines.
All the above equipment is in good condition and prices to sell.

MARCH BROWNBACK CO. INC.
POTTSTOWN, PA.

FISHER MELTING FURNACE

With crucible 18" diameter, gas fired, hood and doors, capacity 2100 lbs. aluminum to 9,000 lbs. type metal, 200 CFM blower 220-440 V 60 C Wheelco Pyrometer, like new, used 30 days.

SMALL MOTORS INC.
2076 ELSTON AVE. CHICAGO 14, ILL.

For Sale

FOR SALE

30—Sets Flasks, 17" x 19" Cope and Drag, 22½" Pin Centers. Bars in Cope and Drag.
50—Sets Round Flasks, 15" Dia., 4" Cope and Drag, 18" Pin Centers. Bars in Drag.
100—Sets 18" Round Flasks, 4½" Cope with Bars, 5⅜" Drag with Bars, 24¼" Pin Centers.
1—Baker-Perkins Mixer. 12 cu. ft.

CHESANING PIPE COMPANY
CHESANING, MICH.

CUPOLA CHARGING CRANE

Whiting mechanical, 4 ton gantry type, 3 motor, 30' lift. Transfer weigh car 7 ton, motor drive with 10 ton Fairbanks Morse scale. Scales 5000# F.M. with Whiting reversing motor driven roller platform. All motors 440/3/60. Equipment new in 1940.

F. H. CRAWFORD & CO. INC.
30 CHURCH STREET NEW YORK 7, N. Y.

FOR SALE

1—Fisher #225 brass furnace, gas fired, tilting, with blower.
2—International molding machines, heavy duty steel boxes 12 x 16 3" cope 3" drag.

BOX 356
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

For Sale

FOR SALE
COMPLETE MECHANIZED FOUNDRY TO BE SOLD AS ENTIRE UNIT

MOLDING DEPT.
3—160' Merry Go Rounds
3—40' x 3' Caterpillar Conveyors
2—Caterpillar Carry Off Conveyors
1—Complete Flask Handling System
2—Complete Sand Conditioning and Distributing Systems
1—B & P Screenarator
24—Osborn Jolt Machines
200 tons Flasks
1 lot Diamond Steel Decking
MELTING DEPT.
3—No. 5 Whiting Cupolas with Charging Eqpt. 40 hp & 27 hp Density Compressors with Control Panel
1—Round Tumble
CLEANING DEPT.
1—Pangborn 14' Rotary Blast Table
1—Pangborn Tumblast System
Battery of 5 Tumbling Barrels
CORE DEPT.
1—Wonder Core Sand Mixer
1—Wadsworth Core Machine
1—Wadsworth Abrasive Cut Off
1 lot Spare Parts
For full particulars, Address:

BOX 351
FOUNDRY CLEVELAND 13, OHIO

MACHINERY FOR SALE

2—Johnston & Jennings Jolt Pin Lift. Molding Machines, 30" x 36" table. 10" draw, ADDRESS GOLD FOUNDRY & MACHINE WORKS, 1618 SOUTH OSAGE ST., INDEPENDENCE, MO.

FOR SALE

1—24"x24' Belt Conveyor, 5 H.P. 220/440V. 3ph. 60cy.
1—#405 Osborn Rollover and Pattern Draw Molding Machine.
1—International Type GS Jolt ram, rollover and pattern draw molding machine, 28"x36" table.
7—#601-13 Osborn Jolt Rollover and Pattern Draw Molding Machines.
6—#2047-4 Osborn Jolt Rollover and Pattern Draw Molding Machines for cylinder head core production.
12—#2048 Osborn Rollover Molding Machines for core closing.
2—30"x40" Tabor Jolt Rollover Molding Machines.
1—#147 Osborn Rockover & Draw Machine for long jobs.
2—#146 Osborn Rockover & Draw Machines.
4—#814-P Osborn Jolt Squeeze Pin Lift Molding Machines.
3—#2166 Spo Jolt Squeeze Pin Lift Molding Machines.
5—Champion Draw Power Push Off Machines 10" draw, 38"x40" table.
2—Milwaukee Jolt Squeeze Molding Machines.
1—#1 Demmler Core Blower—New.
1—#3 Demmler Core Blower—A-1 cond.
10—#92 Osborn Core Blowers.
1—Kane & Roach Wire Straightener, 3/16" to ½" wire, 7½ HP 440V.
1—3 H.P. double stand grinder, belt driven.
2—3 H.P. Blowers for furnaces 16 oz.
2—50 H.P. Spencer Turbine Cupola Blowers 220/440V. 3ph. 60cy. 16oz.
1—20 H.P. North American Turbine Blower 220/440V. 3ph. 60cy. 24oz.
1—American Wheelabrator 48"x42", Model 450.
4—International Type JFL Jolt Ram, Foot lever lift molding machines.
3—Tumbling Mills 30"x60".
1—Eclipse Salt Bath Furnace, M-225, gas fired.
2—500# Monarch Aluminum Hand Tilting Furnaces.
1—Revolving Core Conveyor Table (Bush-Lawrence) like new.
2—Fin Cleaning Machines (Ireland) for cleaning fins on castings.
1—Pig Mold Conveyor 74' long—Link Belt.
1—Jones Worm Gear Reducer, Driving shaft 900 RPM, Ratio 8 to 1 Mounted on C.I., base with 15 H.P. Motor 3ph. 60cy. 440V, 1150 RPM.
2—Jeffrey Type 3 Vibrators for shakeouts.
2—Micromax Instruments Leeds & Northrup Temperature control.
Various sizes steel flasks. Various sizes Hines Popoff flasks & Jackets. Various sizes of core plates.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

15019 Saranac Rd., Cleveland 10, Ohio **Telephone—GLenville 1-1538**

Big enough to hold

30 FOOTBALL FIELDS

under one Foundry roof!

The East Chicago plant of American Steel Foundries is a giant by any standard of comparison—over 30 acres under one roof!

Plants like this are becoming more and more typical of the trend in foundries today—up-to-the-minute in design and equipment—geared for high speed production to meet the ever-growing demand for castings. This dynamic industry is one of the most active of all industrial markets.

. . . foundries spend over $1,000,000 *hourly* for materials and supplies!

. . . value added by manufacture by foundries is $12,000,000 *daily!*

. . . total value of foundry production approximates $104,000,000 *weekly!*

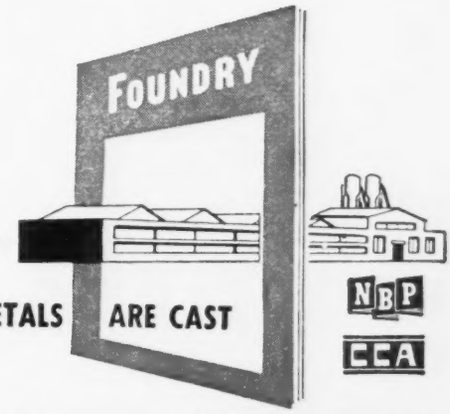
. . . foundry capital investment in plant facilities and equipment exceeds $8,000,000 a *month!*

. . . castings production last year hit an all-time high of 19,000,000 tons!

The way to blanket this dynamic industry is through your advertising in FOUNDRY. It will reach over 45,000 foundrymen who influence buying in the foundries which account for 94% of all castings production.

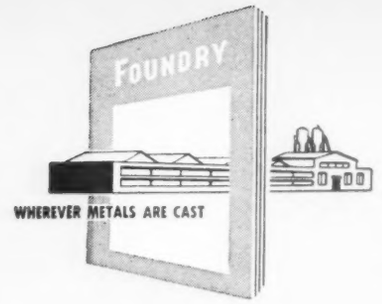
Do You Have This Marketing Guide?

"How To Sell The Foundry Market" is free. Write us or ask your FOUNDRY representative and a copy will be mailed to you.



It's Time to Sell to Foundrymen

WHEREVER METALS ARE CAST



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Dear Reader:

. . . THOUGHTS FOR TODAY AND IDEAS FOR TOMORROW FROM THE **FOUNDRY** BUSINESS STAFF

Collector's Item? We wanted the younger generation of advertisers and advertising agencies to see the first issue of FOUNDRY published in September 1892 so (to celebrate our 60th birthday) we "reprinted" this issue and mailed it to them. Would you like to have a copy? Drop us a line and we'll be glad to send one.

Bernice Plumer: A pretty girl does something for a column. We would prefer to let this issue go to press and not have to report Mrs. Plumer's resignation from the staff to assume full-time duty as housewife. She will be succeeded on October 1 by Mrs. Jeanne Franklin.

—o—

Reading More: We are the worrying type. It bothers us that we don't have time to *read* everything of interest which passes across our desk. By learning to be selective and by concentrating on publications of proven worth, we have shown improvement. We have long since learned that the persistent reading habit gives us not only relaxation but ideas which we can and do use in our day-to-day work.

On the chance that you, too, have a similar interest and "problem", we give you a thought on the subject. A thought prompted by an excellent bulletin "How To Study", prepared by Lola Daugherty, Instructor of English, Hudson (Ohio) High School where Peter and Wendy Pope will (we hope) learn to study at a time (now) when learning comes easy. We have asked Mrs. Daugherty for a few extra copies of this bulletin and will be glad to send copies to any readers interested for their high school sons and daughters.

The part that interested us was the advice that we practice at reading more rapidly, avoiding "word-by-word" reading and looking for the high spots of significant phrases, sen-

(*Continued on page* 334)

(*Continued from page* 333)

tences, et cetera. Change of pace is suggested in developing good reading habit, too—adjusting reading speed and effort to material at hand. Like negotiating Chicago's Outer Drive during the rush hour. Fast and slow as the text demands.

There are those who achieve ability to read paragraphs at a glance. We'll settle for taking in a sentence at a time to start with. It's one conscious effort we can make to keep abreast of today's fast moving developments.

—o—

Foundry Census: The 1953 census of the foundry industry which FOUNDRY has conducted since 1900 will soon be under way. Dave Gibbs, George Auner, Betty Hinton and others on our research staff have spent long hours of consultation with the editors and among themselves to devise further improvements in the 1953 questionnaire which will be mailed to each foundry shortly. Foundry industry statistics on melting equipment, capacities, employment thus obtained are extremely useful to FOUNDRY Editors, government agencies, and the industry itself. If any reader is interested in current foundry statistics for all branches of the industry, we will be glad to send a copy of our 1951-52 report.

—o—

Double feature: We are doubling the popular "Ideas for Foundryman" section this month to catch up on an accumulation of good foundry literature available to readers (see page 269). Your suppliers are glad to send the booklets and pamphlets reviewed. Dave Gibbs, our staff research and promotion aide, reports that any given issue of FOUNDRY offers upwards of 135 worthwhile items of foundry literature. Your subscription will be even more valuable to you if you will obey that impulse and write for current literature.

—o—

Golf: District Manager Bob Chew may have made headlines by the time this appears in print. In any event, he will have enjoyed his favorite pastime in fast company and competed in another Western amateur Golf Tournament. Don't say it! Bob was Junior Champion at Sunset Ridge Country Club, Northbrook, Ill. long before he joined the Business Staff.

F. A. Bolz

Business Manager

Wherever you find Foundrymen... you will find FOUNDRY

THINGS ARE HAPPENING IN THE FOUNDRY INDUSTRY

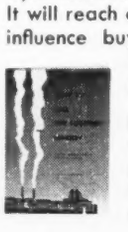
In one of the most extensive studies* ever undertaken in the foundry industry, foundrymen told what publications *they read* and what publications they find *most useful*. FOUNDRY received this overwhelming "vote of confidence".

*We will be happy to show you this complete report. Just drop us a line or ask the man from FOUNDRY.

	FOUNDRY	Publication A	Publication B	Publication C
Readers	596	270	332	205
"Most useful publication"	303	51	35	16

To the question, "Which publication do you find most useful?", FOUNDRY received nearly *six times* as many votes as the next publication, and *twice* as many votes as *all other publications combined!*

To get your product story over to the dynamic foundry market, *tell it in FOUNDRY.* It will reach over 45,000 foundrymen who influence buying in the foundries which account for 94% of all castings production.



Do You Have This Marketing Guide?

"How To Sell The Foundry Market" is free. Write us or ask your FOUNDRY representative and a copy will be mailed to you.

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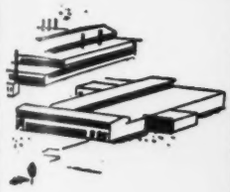


A partial list of Knight clients

Appleton Electric Company
South Milwaukee, Wis.

Canadian Car & Foundry Company, Ltd.
Montreal, Quebec

Crane Company
Chicago, Ill.

Dalton Foundries, Inc.
Warsaw, Indiana

Electric Steel Foundry Company
Portland, Ore.

Erie Malleable Iron Company
Erie, Pa.

Fahralloy Limited
Orillia, Ont.

Fairbanks, Morse & Company
Kansas City, Kan.

Hammond Brass Works
Hammond, Ind.

Haynes Stellite Company
Kokomo, Ind.

John Inglis, Ltd.
Toronto, Ont.

Macfarlane
Sagua la Grande, Cuba

Massey-Harris Co., Ltd.
Brantford, Ont.

Moline Malleable Iron Company
St. Charles, Ill.

National Roll & Steel Foundry
Avonmore, Pa.

Pittsburg Steel Foundry Corporation
Glassport, Pa.

Pyle-National Company
Chicago, Ill.

Spojene Tovarny Na Obrabeci Stroje
Brno, Czechoslovakia

Sulzer Bros. Ltd.
Winterthur, Switzerland

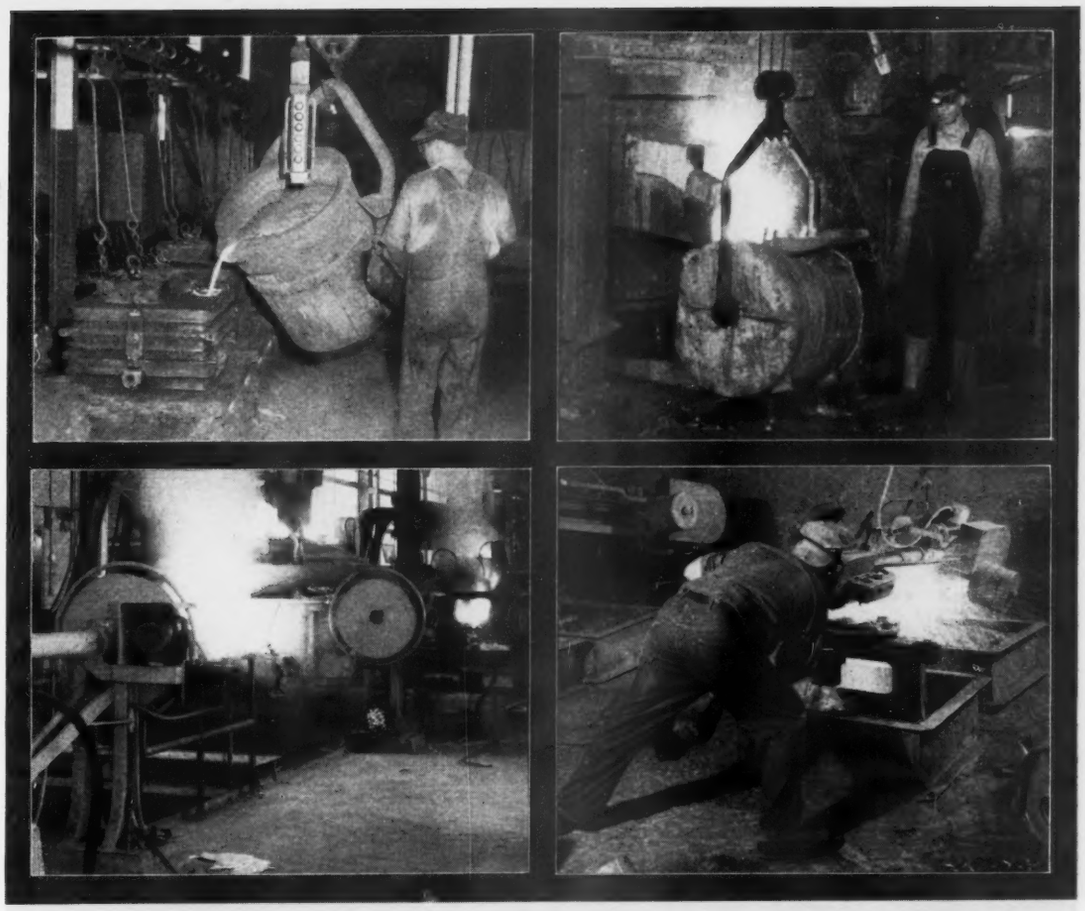
Unitcast Corporation, Ltd.
Sherbrooke, Quebec

Universal Castings Corporation
Chicago, Ill.

Wagner Malleable Iron Company
Decatur, Ill.

Woodruff & Edwards, Inc.
Elgin, Ill.

Worthington Corporation
Harrison, N. J.



Whatever Casting You Produce... Whatever Your Foundry Problem...

Call on Knight Engineering Experience to Help Reduce Your Production Costs

More than 200 successful foundry assignments have given Knight engineers and architects a practical working experience with every type of foundry—grey iron, steel, malleable, aluminum, magnesium, brass, bronze, armor, and allied products.

The Knight organization has a proved background in such fields as:

foundry layout • foundry design • construction management modernization • mechanization • materials handling • production and cost control • wage incentives • organization management

Whatever your foundry problem, you will benefit from Knight experience. Call or write our Chicago or New York office for immediate attention.

Lester B. Knight & Associates, Inc.

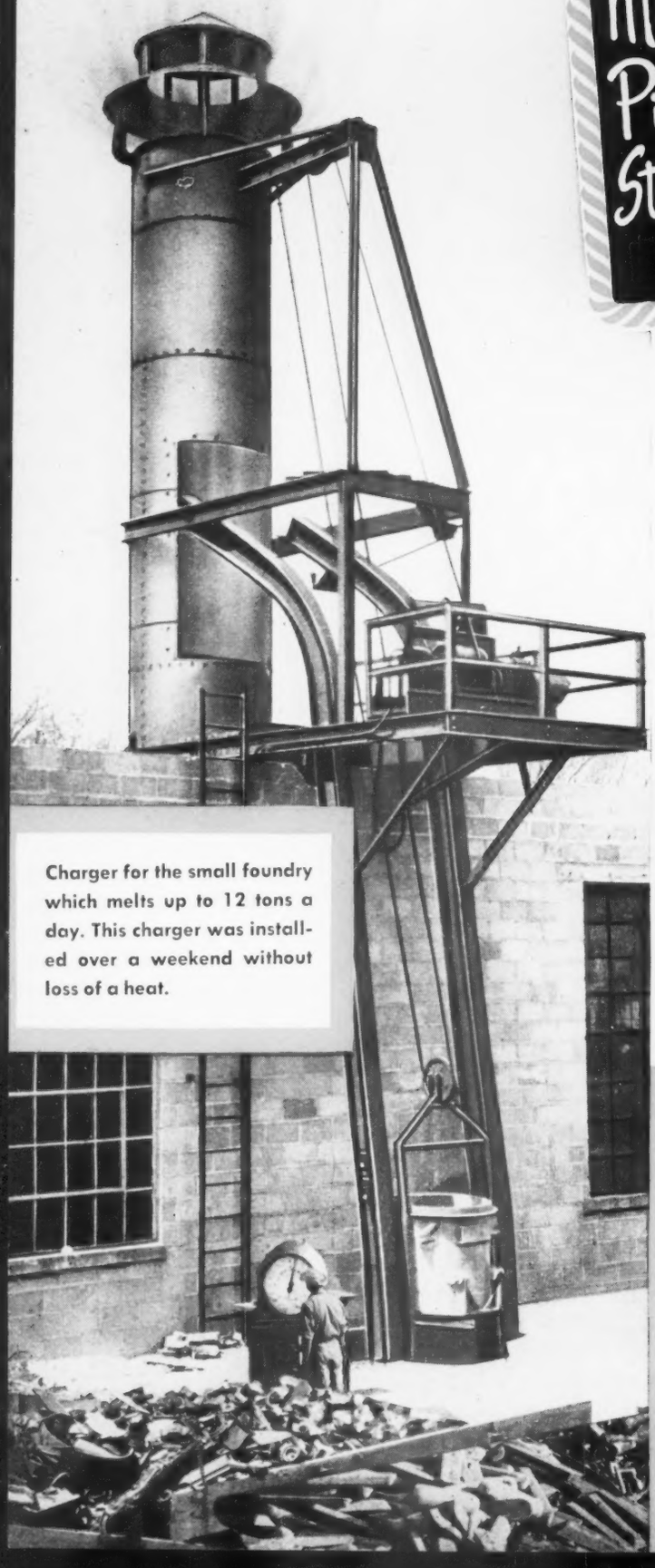
Management, Industrial and Architectural Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

600 W. Jackson Blvd., Chicago 6

Eastern Office—Lester B. Knight & Associates, 50 Church St., New York City 7

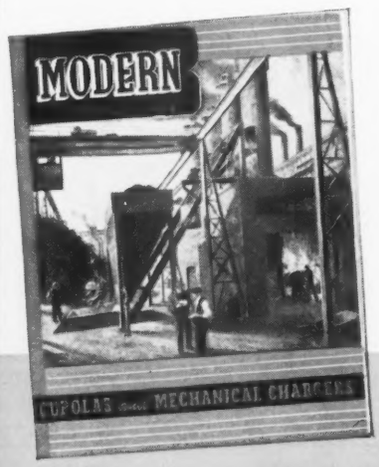
SCALING DOWN CHARGING COSTS...
and making up a charge at the scale...
are figured over two standard formulas...



Charger for the small foundry which melts up to 12 tons a day. This charger was installed over a weekend without loss of a heat.

equal greater over-all profits when charging is done mechanically.

Relieved of much back-breaking work fewer yard-men are needed to control the automatic charging equipment. And through closely WORKING TOGETHER with practical foundrymen MODERN engineers have developed this moderate-priced charger specially for the small foundry. Hotter, more uniform metal reduces the volume of waste. Fewer lost time accidents help to keep men on the job. For all the facts and figures on this type of charging, for the small foundry, write for catalog 147-A.



Complete information on cupola charging will be mailed, along with catalog 147-A, to foundry executives who outline a problem on their company letterhead. Use the coupon for catalog only.

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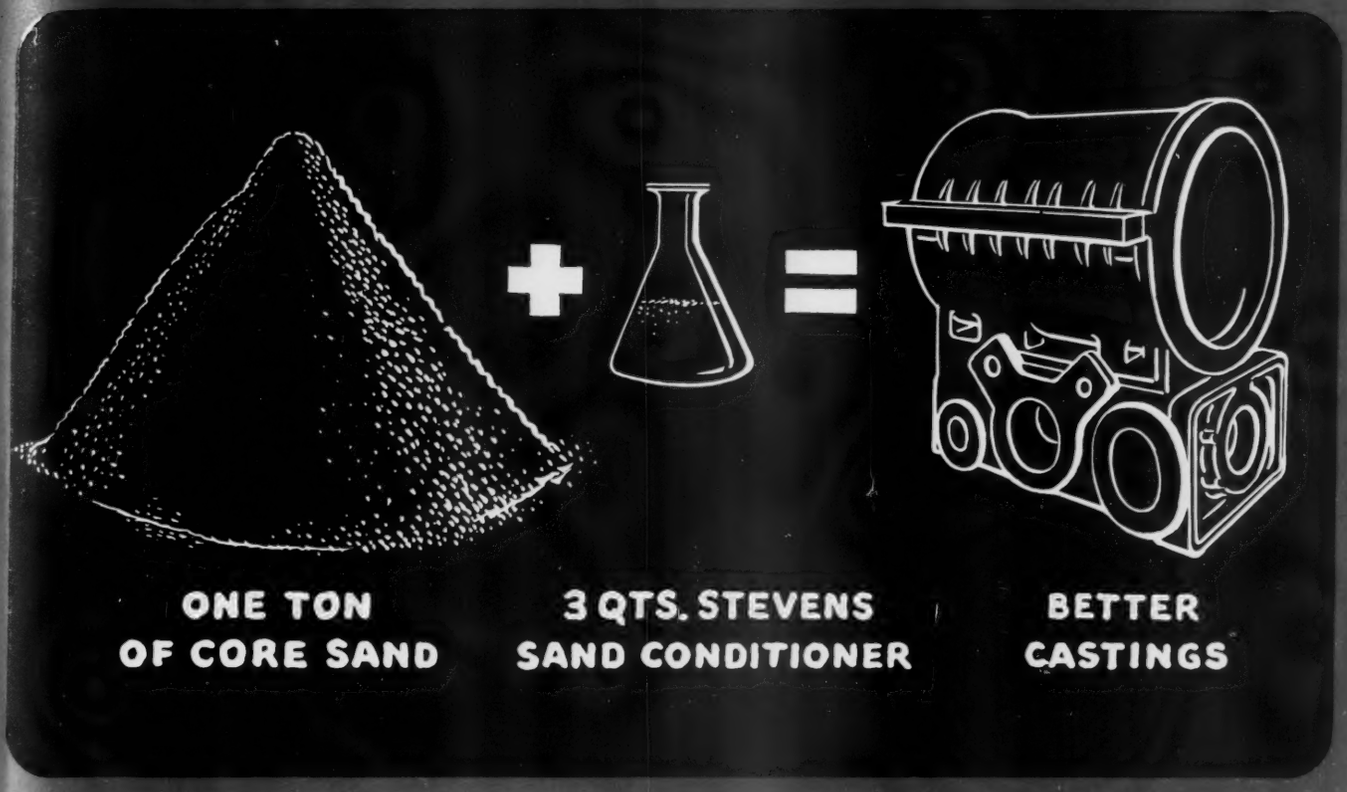

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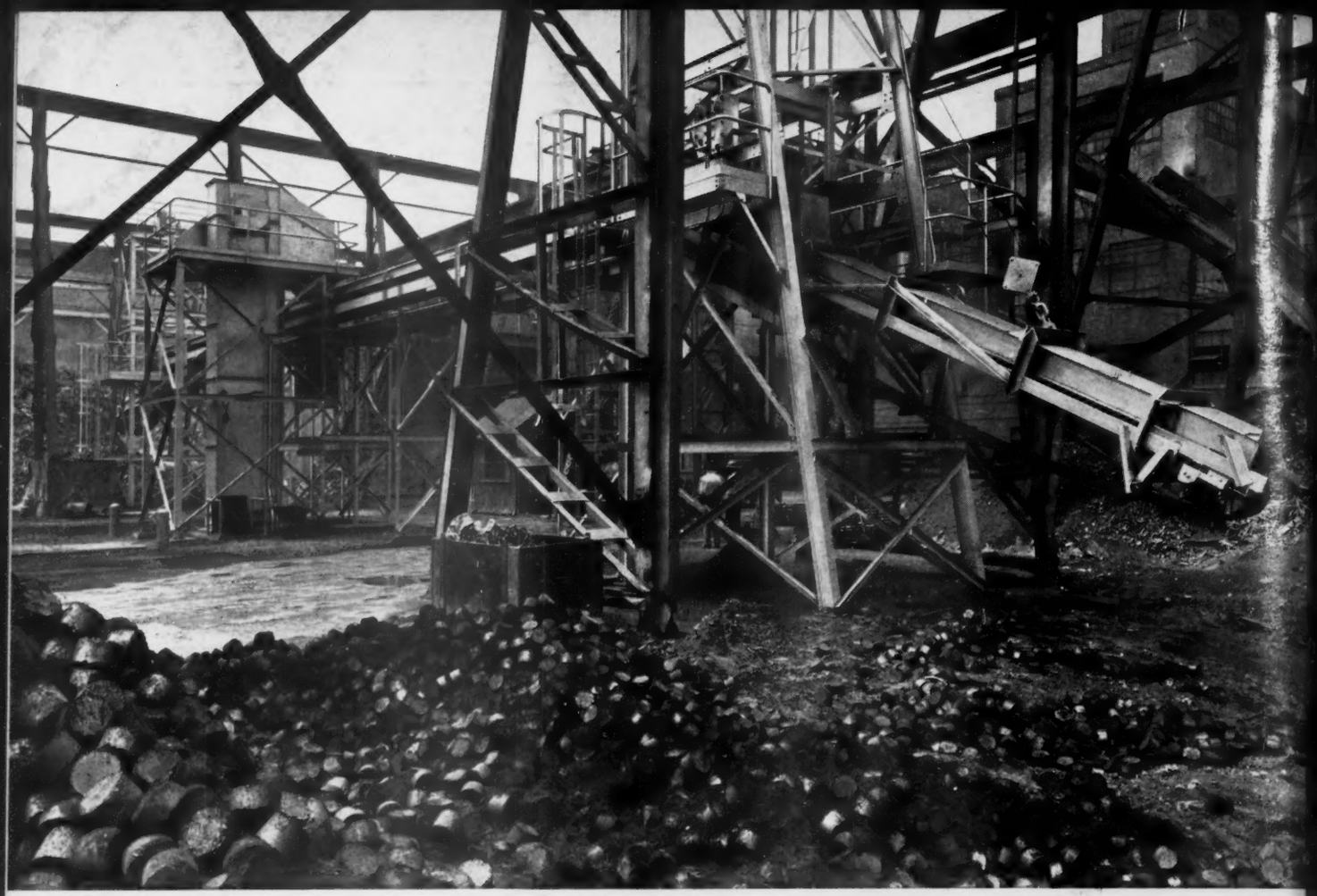

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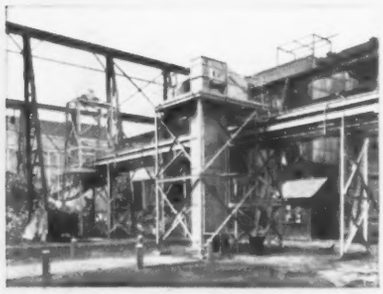

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